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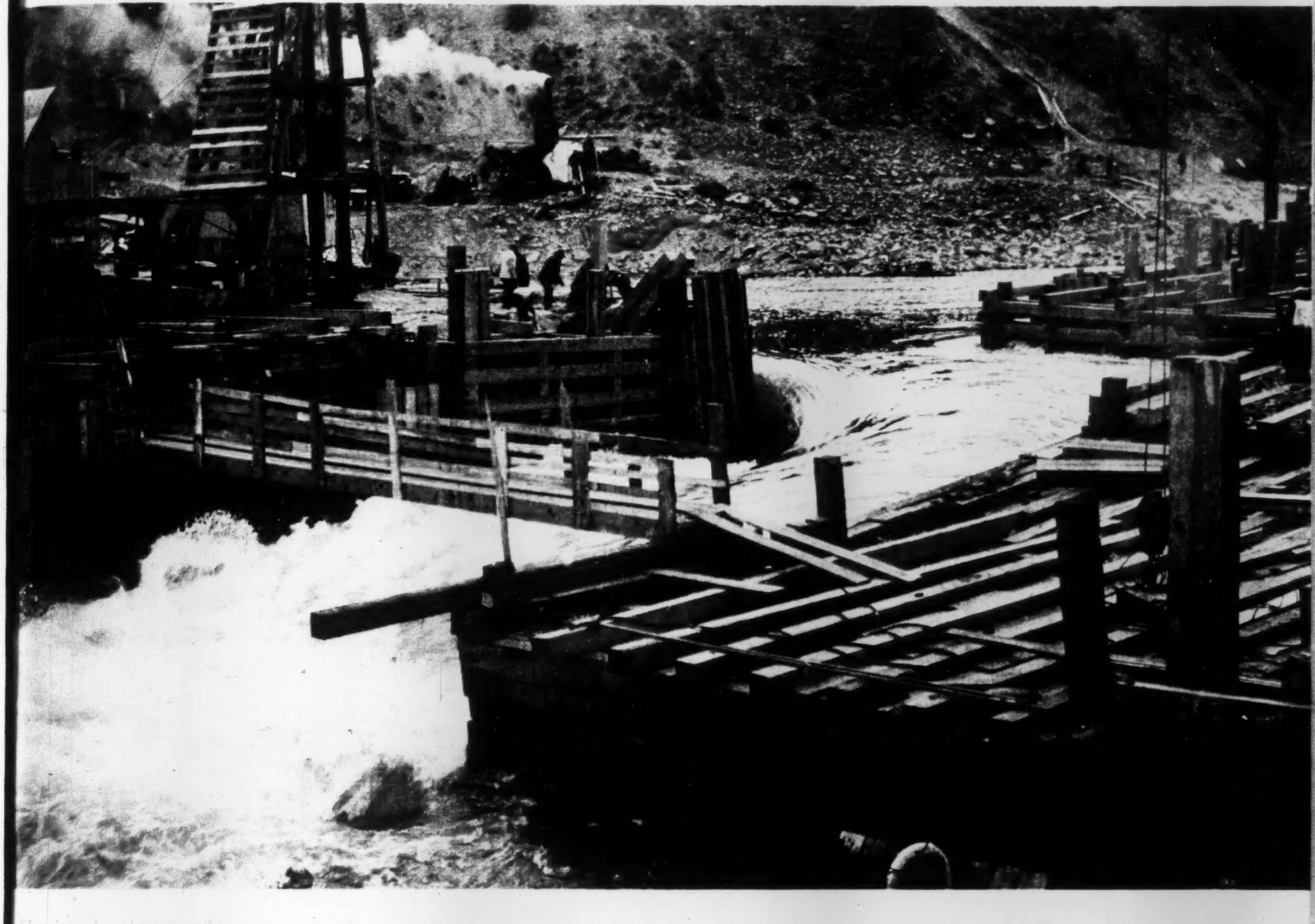

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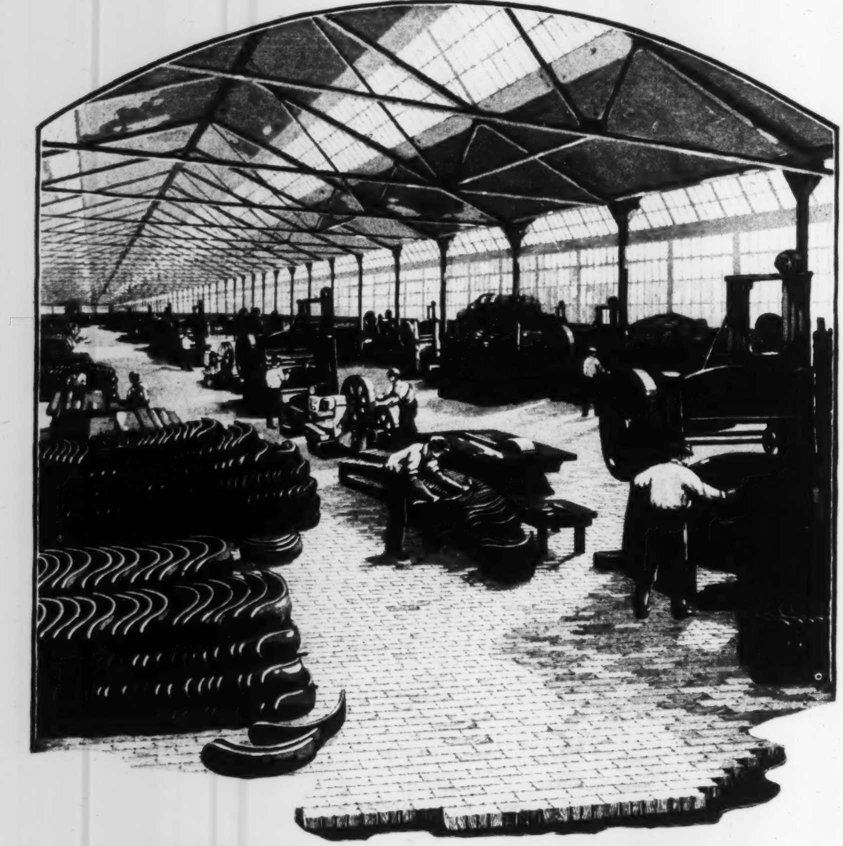

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ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION — ESTABLISHED 1874

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, APRIL 30, 1931 Number 18

Charity or Business

IF IT proves possible to organize a low-interest loan system for house building, such as is under discussion in Washington, we may see a real economic revolution, and a beneficial one. The medieval system that has held house finance in its thrall is deeply intrenched, and so far no one, least of all our bankers and other agencies of finance, has had the courage to modernize it. High interest rates, premiums, fees and usurious methods of many kinds have survived, in the absence of a free market for building loans. Until such a market exists, building must go forward under a heavy impost. If those interested in the present movement have the will and the courage to work in this direction, they may succeed in thawing out frozen initiative on a vast scale, to the country's lasting good. If they intend only to provide some temporary local relief to a few, their work will be of negligible effect. The meaning and merit of the movement depends on whether their aim is philanthropy or business.

Essential Data

FULLY analyzed cost figures of engineering works are uncommon. A recent example, figures for the Akron sewage-treatment plant, is an encouraging illustration of what can be done. In that statement, published four weeks ago in our columns, the costs per million gallons and per capita were broken down into individual figures for each plant element. These are valuable data. Generally only total costs are given. Practice differs in respect to including land, accessories, engineering expense and various financing and administration expenditures. Considering further that treatment plants differ in the number and kind of elements included, unit costs based on totals are uncertain guides to the cost of new works. In the Akron tabulation, with the total cost of $3,750,000 allocated to some seventy items and thirteen works elements, the estimator is given a multiplying factor for each plant unit as well as for the whole plant. As with all cost records, the figures must be interpreted in the light of prevailing prices and wages, but they extend greatly the engineer's aids for estimating the cost of undertaking sewage treatment for cities.

Politics Resurgent

TENURE in office of public-works engineers in Louisiana has so long been a whim of politics that change is expected whenever a new faction gains power or the faction in power decides to redistribute favors. Recently, however, new magnitudes of irresponsibility have been exhibited. Until a few weeks ago the state highway department has held the record of vagary in hiring and firing technicians. New Orleans now challenges this record, indeed has so far surpassed it that mention of former highway department actions seems trivial. George B. Earl, head of the city sewerage and water board for twenty-five years and originator and executor of the system of canals and pumping plants that make the Louisiana metropolis notable, has been removed from office with his principal assistant, John T. Eastwood, and his director of water purification, John L. Porter. Following the dismissal of John F. Coleman as consulting engineer of the dock board, and supplemented by the discharge of 220 sewer and water department employees, many of them technicians, this removal from public service of trained engineers represents about the limit of factional veniality, even in a state administration noted for political brigandage. New Orleans people are unfortunate in being the victims of political revenge at a time when engineering skill and experience are required to solve pressing problems of drainage extension and lake-front improvement and to secure protection against storm-tide inundation.

A Hopeful Sign

GOVERNOR ROOSEVELT has vetoed an amendment to the New York State multiple-dwelling law which would have put licensed professional engineers on a par with registered architects in the filing of plans for apartment houses in cities where that law is effective. The veto is a temporary victory for the architects in their fight for advantage through class legislation. The law, as written three years ago, says that only the owner or a registered architect acting as his agent may file plans for multiple dwellings. Engineers have attempted to have their own profession permitted to act as the owner's agent along with architects. Last year legislation to this end failed to pass the legislature because engineers had not succeeded in convincing enough legislators of the soundness of their position. This year they succeeded in having both houses pass a similar bill, meeting much less opposition on the ground of their supposed lack of qualifications for the work involved. The Governor vetoed this bill because of the way in which it was drawn. The fact that the legislature has been convinced and that the Governor vetoed it because of details rather than principle is an encouraging sign. It indicates more general acceptance of the claim made by engineers that when the protection of life, health and property through safe construction is involved—the basis for enactment of the law in question—engineers are fully qualified to act as the owner's agent. Acceptance of this view is half the battle; it will simplify the work of engineers in the next session of the state legislature.

Higher Qualifications

ANOTHER local event of interest far outside the limits of the state concerned is the passage of an amendment to the engineer license law in New York State raising the qualifications for a license to practice. The New York law heretofore required simply that the applicant be able to show evidence of six or more years of active engagement in professional engineering work, one of which shall have been in responsible charge of work. No fundamental common-school education was required. The new law requires that the applicant show evidence of having satisfactorily completed a four-year high-school course or the equivalent thereof and that he show evidence of eight or more years of practical experience in professional engineering work of a grade and character satisfactory to the license board. Written examinations on subjects prescribed by the board also are required. Inclusion of these higher and more definite qualifications in New York State license law, affecting a large percentage of the future engineers of the country, is an important step forward in the whole matter of licensing engineers. If engineering is to hold a position on a par with professions such as architecture, law and medicine, it must set up for itself comparable educational requirements.

What Happens in Practice?

AS TESTS on flame-cut wind brackets continue to be reported, doubt that the operation is in any way harmful steadily lessens. Early tests indicated that the rough edges resulting from normal cutting promoted the development of cracks. Later, question was raised as to the practice of punching the pieces before flame-cutting; this was held to promote embrittlement and reduce impact resistance. Subsequent tests refuted the idea that the sequence of operations had any bearing on the efficiency of the details. Sawed brackets showed qualities almost identical with those of flame-cut work. Tests reported in this issue go farther. The edges of the brackets were planed after flame-cutting, with no beneficial results. Test results of drilled and punched specimens were found to be closely similar, tending to minimize the contention that punching promotes embrittlement. Additional tests should and probably will be made. In the meantime it might be enlightening to forget theoretical considerations and examine the service record of flame-cut brackets. Accurate knowledge of how many brackets have to be replaced on a building because of failure during shipment, erection or subsequently would provide a measure of the concern that should be felt for the subject. It would also assist future investigators in planning a proper and adequate test program designed to dispose of the controversy.

Mineral Aggregate Refinement

THE confidence with which producers of crushed materials guarantee precision in sizes and mixtures is excellently explained by the slag-crushing plant described in this issue. This plant exhibits a simply astounding array and coordination of crushing, conveying and sizing machinery to produce a material the plant price of which is one or two dollars a ton. In part this mechanization is practiced to cheapen manufacture, but its greater purpose is to meet the exacting demands of modern construction for many sizes and combinations of sizes of crushed materials. Plants producing crushed stone or slag, as well as gravel and sand washing and screening plants, are guaranteeing sizes and mixtures to meet virtually any specification requirement. Where mixtures are required they are taking marvelous pains so to load cargoes that segregation will not occur. They are doing a better job in preserving uniformity of sizes and mixtures than is being done generally by engineers and contractors after the materials come to their hands for use. The modern plant producing mineral aggregates is a highly developed creation for the service of construction.

Safe Construction

WHOEVER sees an interested crowd gather around a piece of construction work recognizes the fascination that every such operation exerts on the average member of the public. The maneuvers of shovel, hoist, rock drill or paver are followed with keeneyed attention by the onlookers. Admiring the power and perfection of the machine, they learn to harbor no distrust of the work; its difficulties and hazards are perceived and understood. Quite otherwise with work that goes on unseen in the depths of the earth. The headhouses of a tunnel shaft are symbols of strange doings in the remote darkness, fit setting for every danger or dramatic adventure. In such mental atmosphere has the accident record of the great Brooklyn aqueduct tunnel aroused suspicion and concern. Is it safe? the public is asking. Are needed precautions omitted? Is the work driven at too great speed?

It is safe, we are able to answer. Careful and repeated study of the work, in many different sections, tells a story of great natural hazard and difficulty, of the contractor's skillful and persevering attack on these obstacles, of close cooperation between engineers and contractor in protecting the working forces, and of an enterprise put through not only efficiently and rapidly but also safely. Safety precautions and control are excellent. There is no overspeeding; in fact, were the work to be extended over ten years' time instead of being completed in three, its result in the way of accidents would not be better, but in all likelihood worse.

Modern engineering skill and equipment have wrought marvels in making construction work safe. Yet safety amid the hazards of a difficult enterprise will ever remain a relative term. Mischance waits at every turn. And preeminently in tunnel driving is attainable safety less than absolute safety. The tunnel builder constantly faces the unforeseen; at all times potential injury or death hovers about, perhaps very near, as the unknown conditions of rock, water or even gas may determine. In the Brooklyn tunnel the rock hazard is great. Fissuring and broken structure to some degree, but in far higher degree spalling and cracking due to release of strains, constitute dangers that lurk here and there at unsuspected points. Heavy inflows of water complicate the work, and, though so far not a direct source of accident, they often predispose to mishap. The working methods, the protective devices and organization, and the care in supervision, are keyed to these conditions as closely as modern tunneling skill can suggest.

Specifically, the drilling and blasting of the rock are well planned; the procedures are in no way extreme, risky or hurried. Face work is safeguarded by the best methods and aids of rock tunneling. The so-called mucking out, or removal of the broken rock, least dangerous of all the operations yet a frequent source of accident, is no less excellent and conservative in its detail practice. Hoisting is surrounded with even more care and mechanical protection than customary in such deep shafts. Scrutiny of the tunnel walls and roof and installation of timbering and lagging where fracturing is suspected are done carefully and frequently. Probably no increase in safety could be attained through yet more frequent examination, such is the nature of the rock penetrated. And be it remembered that the peculiar behavior of the rock is chargeable with fully half the fatalities that have attended the work.

We are dealing with a great work, one of the greatest tunneling enterprises man has ever attempted. The longest of the imposing tunnels that pierce the Alps, even the Simplon, does not exceed half its magnitude. Its cost is some measure of rank, for in dollar terms the Brooklyn tunnel closely approaches the Hoover Dam. But dollars do not directly spell hazard. That is expressed more significantly by the twenty miles of length, the six and seven hundred feet of depth, the many shafts and twenty-odd headings, the tons of dynamite exploded each day and thousands of yards of broken rock removed. Yet in the face of these hazards the average worker on the tunnel would meet fatality only after a hundred years at his job.

Our study does more than acquit the men engaged in the work; it shows that they are entitled to praise for a well-organized and ably handled operation and for unremitting efforts to cope with the hazards of the work most effectively. This, however, is what the profession expected of them, for the city's engineers as well as the contractor and his staff are men of ability, seasoned experience, and conscience. Their known qualities add assurance that the work will go to its completion well and safely. It has been so conducted up to now.

Engineering Brokerage

CALIFORNIA has a peculiarly favorable opportunity to enforce the dictum of its state law that only registered engineers may render engineering services.

Recently the city of San Diego earned notoriety by calling for bids for the design of a sewage-disposal system and by receiving and accepting a bid from Frank W. Seifert, said to be a plastering contractor. The contract made with Seifert stipulated that a sanitary engineer should be employed as consulting engineer. However, the state Board of Registration for Civil Engineers undertook to obtain the arrest of Seifert on the ground that the contract was for engineering services, in violation of the state law for the registration of civil engineers. Before a warrant was issued the city council amended the contract to state that Seifert should not do any engineering work but that all engineering should be done by a registered civil engineer, Seifert being made simply a broker for engineering services.

That was early in April. Two weeks later the board of registration issued a statement expressing doubt as to whether it should test the legality of the city's attempt to evade the registration law in this manner.

The board's hesitancy is unfortunate. There is no doubt as to what would happen were the contract for legal services: lawyers would leave no stone unturned until the contract had been declared void, thus nipping in the bud a precedent for the recognition of brokers in legal services. Are engineers to be less diligent in defense of their functions? The state attorney-general has held that the original contract was illegal. It is hardly possible that a resolution by the city council can convert it into a legal document. Whether or not we are to develop brokerage in engineering services in this country may hinge on what happens to the San Diego contract.

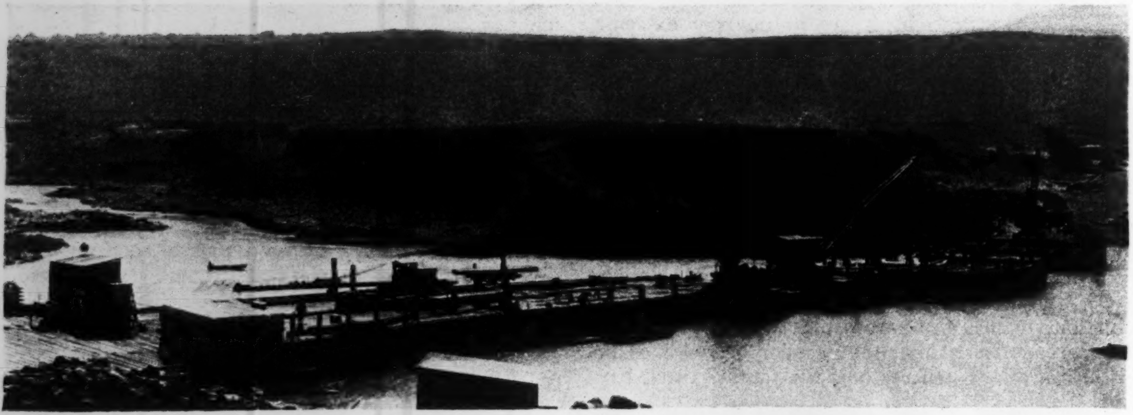
A Warning of Fire Hazard

MYSTERY surrounds the fatal Chicago sewer tunnel fire only in respect to its origin. Testimony given at the coroner's inquest denies the ignition of sawdust calking by the workman who was using a candle to locate air leaks in the mud ring that sealed the heading under air pressure from the open tunnel and shaft. No other source of flame has been indicated.

The fact that the opening in the lining, through which the compressed air entered the finished tunnel, has not been found indicates no more than that as yet no one has been keen enough to discover it. Air was escaping through the seal into the timbering behind the concrete, and this proves the existence of free exit somewhere; and since the smoke of the fire escaped into the tunnel and not elsewhere it is clear that this exit was through the casing of the tunnel.

With a draft thus open and with compressed air behind the fire to create a rapid current and supply excess oxygen, the quick combustion of the timber lining, even when closely confined between wet concrete and wet clay, presents no mystery. Nor is it surprising that the fire was not extinguished by the small hose stream that was used after the discovery of the flames. As long ago as the construction of the Brooklyn Bridge the persistence of combustion in compressed air has been a well-known phenomenon. In the Brooklyn Bridge work it nearly caused disaster in sinking one of the tower caissons. Fire had in some way entered the joints between the close-bolted timbers of the heavy working-chamber walls, and it resisted all attempts to extinguish it, so that at one time flooding of the caisson was contemplated. Recollection of a narrative of the accident by an engineer who helped fight the fire is dimmed in respect to details after forty years, but the fact that combustion worked its way beyond control into the tightly swollen joints of caisson timbers still remains bright in memory, a warning against fire hazard in compressed-air work.

The lesson of the Chicago sewer-tunnel fire is that open flame has almost as little place in timbered construction under compressed air as in a gaseous coal mine. Accidents from fire in compressed air have become so rare, as changed construction methods have eliminated timber in tunnels and caissons and given workers the electric light instead of lamps and torches, that the modern constructor has almost forgotten the possibility of danger. The Chicago disaster will have furnished some small recompense for the lives sacrificed if it reminds engineers and contractors again that fire is a special hazard of pneumatic construction.



Cofferdam construction at Rock Island dam site

Cofferdamming the Columbia at Rock Island

—A Real Construction Battle

River bottom sounded in sub-zero weather—Timber cribs held and sunk in 15-m.p.h. stream—Unwatering 25 acres in five days proves work effective

TURNING the Columbia River from its channel for the first time in its history to permit foundation construction work on the Rock Island dam, now being built for the Washington Electric Co., near Wenatchee, Wash., constituted a construction struggle of unusual severity and resulted in a remarkably successful job of river diversion. Low flow in the river occurs during the months of severe winter weather, and the sudden decision to begin work late in January, 1930—at the issuance of the federal license—in order to save an entire year in the construction program permitted only two and one-half months for completion of the diversion works. Definite plans for the cofferdams were not completed, and the work of locating, designing and building these two timber-crib structures, with an aggregate length of about 1,500 ft. and a maximum height of 58 ft., was completed in 70 days, with only one day to spare before the river reached flood stage.

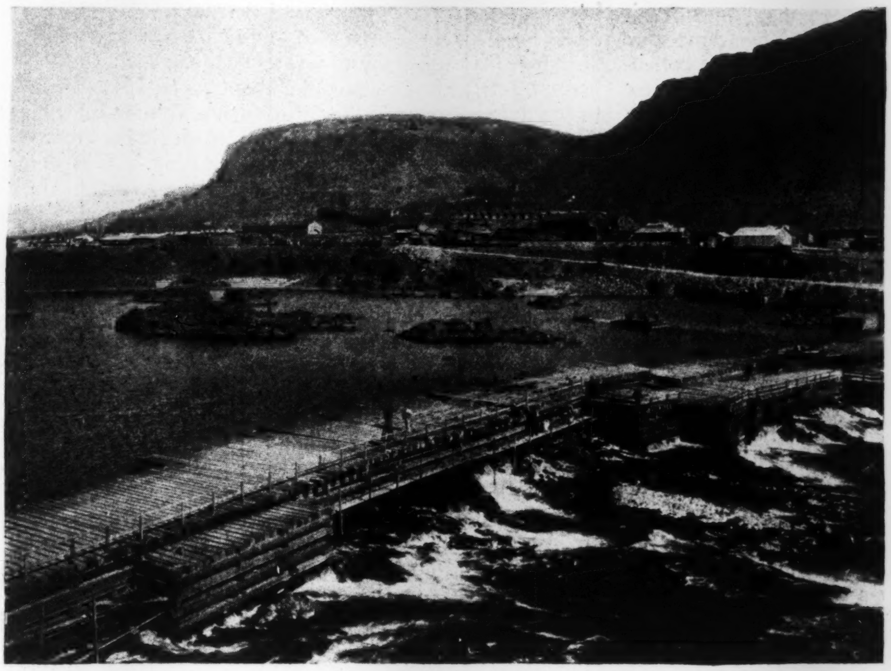
Above the Rock Island site, situated roughly in the center of the State of Washington, the Columbia River has a drainage area of approximately 89,000 square miles with a discharge varying from a minimum of about 21,000 sec.-ft. to flood records approaching 740,000 sec.-ft. The average annual flood peak is approximately 350,000 sec.-ft. and may be expected during any of the high-water months, extending from April to September.

The site derives its name from an island approximately in the center of the river, which is practically submerged during high water but has a width of almost 1,000 ft. when the river is at low stage. This natural feature permitted a diversion scheme for unwatering one-half of the channel and then reversing the process by diverting the river back through openings in the completed section to permit the second half of the dam to be built. The rise in the river between low and flood stage averages about 30 ft. and may exceed 50 ft. This fast constituted a major consideration in any diversion program.

Final governmental approval of the project was received on Jan. 21, 1930, leaving about 85 days before the average date of floods that would overtop diversion dams of economic height. If the river could be diverted from one-half of its channel within this period, construction work could be carried on during the 1930 low-flow season; otherwise, completion of the project might be delayed for an entire year. It was decided that every effort would be made to accomplish this diversion work in the required time, and crews were at work on preliminary features before the end of the month.

By the end of 30 days 500 men were at work, a railroad siding from the line of the Great Northern Railroad passing the site had been completed, warehouses and shops were built, accommodations for the crew were well started, and a power line had been built to the site. While this construction was in progress the more essential work of determining the cofferdam location was being rushed. Detailed plans had not been prepared for the diversion works, and problems of location, design and construction were met and solved on the site under the pressure of time and adverse working conditions. Weather conditions during this season are severe, much of the weather being of sub-zero temperature with 15 deg. below not uncommon.

The location of the dam having been previously established, it was necessary to find suitable cofferdam positions above and below the site between the east shore and the island. Preliminary exploration was done by sounding across this channel on various alignments. This hazardous job was done from small boats worked across the channel from cables. Soundings from these boats in 35 ft. of icy water running from 10 to 15 m.p.h., with lookouts to warn against floating ice cakes sometimes 4 ft. thick, provided an engineering feat of unusual severity. The depths were measured with lead weights on piano wire, and in the deepest section 50 lb. of lead was required



Upstream cofferdam before sealing

Preparation about completed for flood, timber decking in place. Construction camp is in the background.

to overcome the rush of water. At each sounding a stadia shot was taken of the location to permit plotting of the channel bottom.

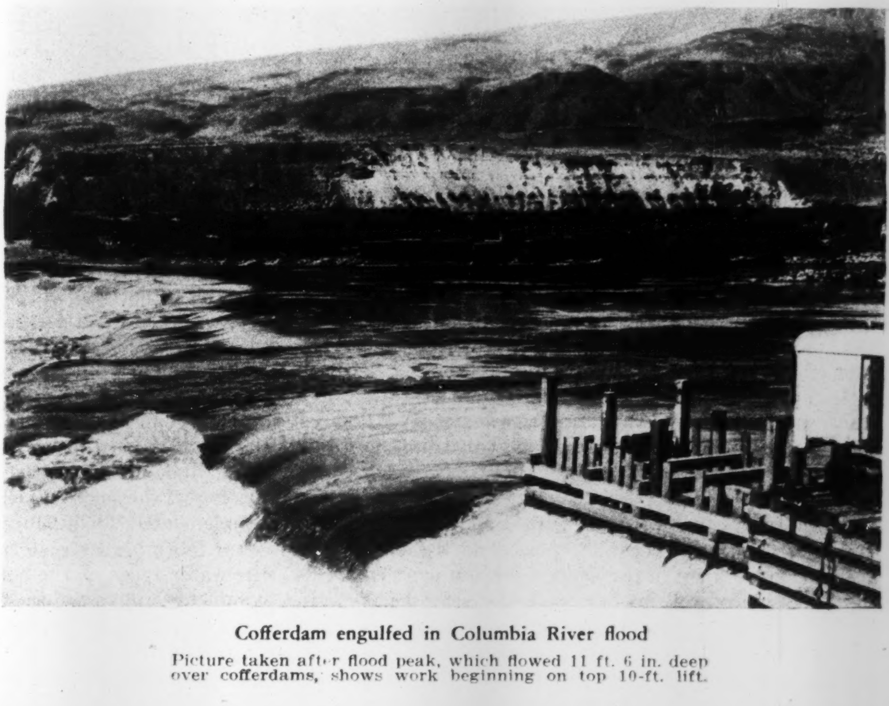
Based on these preliminary observations, which included about 1,500 soundings and occupied approximately 30 days, the features of the channel were determined sufficiently to permit the establishing of the cofferdam locations. Work was begun immediately on the eastern or shore end of the cofferdams, and the program of soundings continued in more detail to provide data for the crib design.

The work of sounding for the cribs was even more trying than the preliminary work because of the necessity for securing accurate results and keeping ahead of the construction work sufficiently to permit the design to be fabricated. Soundings were made by rod from a shaft held in position by leads from a cable spanning the channel. The lower end of the rod was held by a bridle, with lines reaching upstream to assist in holding it against the rushing water. Frequently the rod became coated with ice, and the ice on the raft and equipment made the work extremely dangerous.

The method consisted of setting the front edge of the raft on a definite transit line and sounding at 4-ft. intervals along this edge. Then the raft was allowed to drop back 4 ft. and another line of soundings was taken over the area required for several cribs. This permitted the bottom of the channel to be plotted on 4-ft. coordinates.

Careful coordination of the work allowed crib construction to be started while sounding was continued, and the results were worked up in the form of wooden models showing the topography of the rocky river bottom. These preliminary models were made on a scale of 1 in. to 5 ft., and the cross-sections were cut from thin boards with a bandsaw. A model for a section of the river bottom having been constructed, the next step was to build a model crib as a direct guide for the framing crew. These working models of each cofferdam crib were built on a scale of ½ in. to 1 ft. with small sticks representing each timber of the actual crib. The lower surface of the crib models was designed to fit the rock of the channel bottom as it was indicated by the preliminary small-scale models.

The actual cofferdam cribs were of various sizes but were usually in units of 16 and 32 ft. or multiples thereof to conform to the length of timber available. A 16-ft. crib unit was the common size, the lengths up and



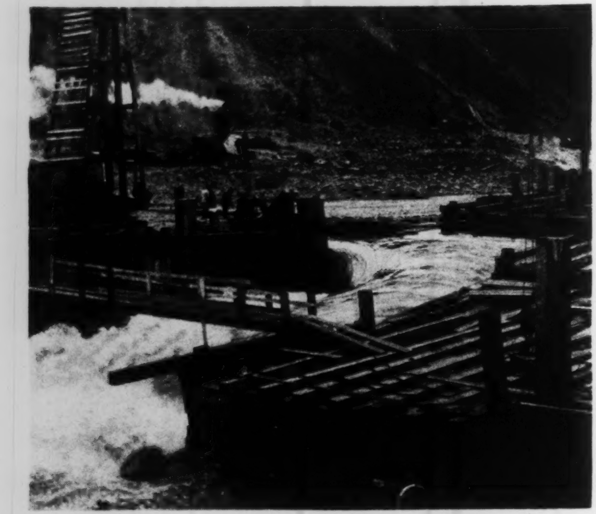
Cofferdam engulfed in Columbia River flood

Picture taken after flood peak, which flowed 11 ft. 6 in. deep over cofferdams, shows work beginning on top 10-ft. lift.

down stream ranging from 24 ft. to a maximum of 80 ft. in the deepest portion of the channel. The frame was built of 12 x 12-in. timbers, bolted or drift-bolted together. The bottom of the crib, built to correspond to the model and thus fit the irregularities of the channel, was covered with a layer of 4 x 12-in. planks to form pockets for the rock ballast. Ready for floating into position from the construction yard, the cribs were from 5 to 6 ft. high. The yard was served by a spur track and was convenient as to accessibility for supplies, engineering supervision and point of use. A total of about 3,000,000 b.ft. of timber was used in the two cofferdams.

Cribs were floated into position and sunk as completed. The maintaining of these units in exact position while the rockfilling was being placed required from seven to ten 1½-in. steel-cable guys because of the swift water. As the rockfilling was placed the cribwork was built up as sinking advanced. This work of locating and sinking the cribs was especially dangerous, and extra safety precautions were taken to safeguard the work. Nets were provided wherever possible, lifelines were stretched near the work, and boats were kept in readiness downstream for rescue work.

Stability of the cofferdams was a major factor, since they were to be overtopped in the following flood season by a flow that might reach a depth of 20 ft. In addition, the crest elevation of the cofferdam had not been decided when construction began, and, as a result a base of conservative width was started and the maximum cross-section carried up as indicated in the accompanying sketch.


Typical cofferdam closure operation

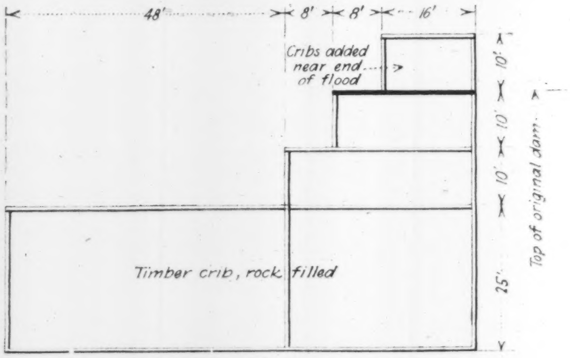
As the work progressed into deeper water from both sides, the difficulties increased and the narrowing of the water gap necessitated more care in handling the cribs. A particular advantage was the fact that the low-water season was exceptionally low, decreasing from a flow of 30,000 sec.-ft. when the work started to a minimum flow of about 24,000 sec.-ft.

The faces of the two cofferdams that were to resist the water pressures were faced with two layers of 2-in. planking, with tar-paper filler placed as the cribs were sunk into position. On the deepest section wooden sheetpiling was placed on the face with the aid of a diver to direct the work for securing maximum closure against the bottom. The swift water had scoured the channel free of loose material, and the bottom was clean hard basalt. About March 1 the decision was reached to level off the cofferdam constructed at El. 570 ft., or about 20 ft. above elevation of low-water stage. This elevation was expected to be overtopped about April 15, according to the date of average flood for such a volume of water. The tops of both dams were covered with timbers to keep the water from disturbing the rockfilling. This completed the preparatory work, and actual construction work in the river was suspended during the flood season.

Naturally, a certain amount of risk was involved in building these cofferdams prior to the flood season and subjecting them to such terrific flows of water as the Columbia River carries. However, the advantage to be gained in length of working season the following year was so great that the risk was considered justified.

Gradually the water rose from the minimum level, which was approximately 10 ft. below the top of the cofferdams as originally built; and on April 16, only one day later than the anticipated time, the water reached the top of the upstream cofferdam. The river continued to rise gradually until June 28, when it was flowing 11 ft. 6 in. deep over the cofferdams. This elevation represents the peak flood-flow of the year, equaling approximately 275,000 sec.-ft. in the entire river, and is considerably below the annual average high-water mark.

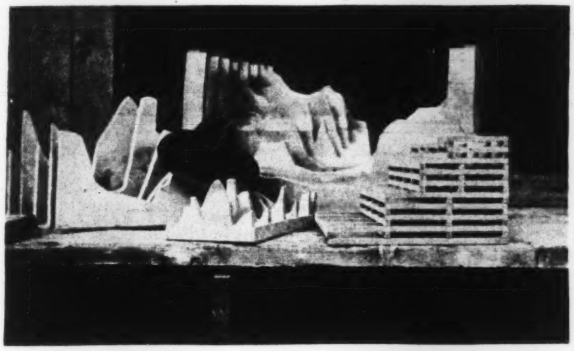
Following the maximum flood the water receded slowly, but the length of time necessary for it to reach the tops of the existing dams made it advisable to place an additional 10-ft. lift on both dams to permit an earlier unwatering of the river channel. The outer walls of both cofferdams had been accurately located by transit before the flood, so that the upper lift of cribs could be placed to make the water faces coincide for sealing.



Sketch of maximum crib section

When the water had receded to a depth of 6 ft. flowing over the dams, the work of extending their height was begun. Timber cribs 10 ft. high were built similar, in general, to the sections of the original cofferdams. Targets were placed at each end of these cribs to enable them to be located on a transit line when floated into position. This line had been accurately calculated to place the upstream face of these cribs on the line of the original dam, and the general procedure of placing and sinking followed the practice used in the previous work. Final closure of these upper sections was followed immediately by the placing of the seal material. About 16,000 cu.yd. of clay, supplemented by quantities of hay, sagebrush and any other looes binder material available, was dumped along the water faces of the cofferdams. When the seals were completed, unwatering was begun from two stations.

The centrifugal pumps used for unwatering included two each of the 10-, 14- and 16-in. sizes, driven by an aggregate of 520 hp. in electric motors and throwing



Crib model and cross-sections
A scale model of every crib was made for the framing crew.

about 50,000 g.p.m. Within five days from the time of beginning the unwatering proceedings the work was accomplished, and 25 acres of Columbia River bottom was exposed for the first time. The short time required for unwatering and the fact that after removing the water one 10-in. pump running intermittently was sufficient to keep the water out are remarkable evidence of the effectiveness in placing and sealing the cofferdams against the rock bottom.

Work on the foundations of the dam began immediately following dewatering, and work is being rushed to make maximum use of the low-water period. The completed structure will be a low-head regulating dam with considerable incidental pondage, approximately 4,400 ft. long and 108 ft. high at maximum section and containing 200,000 cu.yd. of concrete. It will provide an operating head varying from 51 to 20 ft. that will be used for the present installation of four 21,000-hp. units with the ultimate addition of six more.

The Rock Island dam is being built by the Stone & Webster Engineering Corp. for the Washington Electric Co., a subsidiary of the Puget Sound Power & Light Co. W. D. Shannon is general superintendent, with headquarters in Seattle, and H. F. Anthony is project manager. R. E. McGrew is constructing superintendent, and T. T. Walsh is resident engineer.

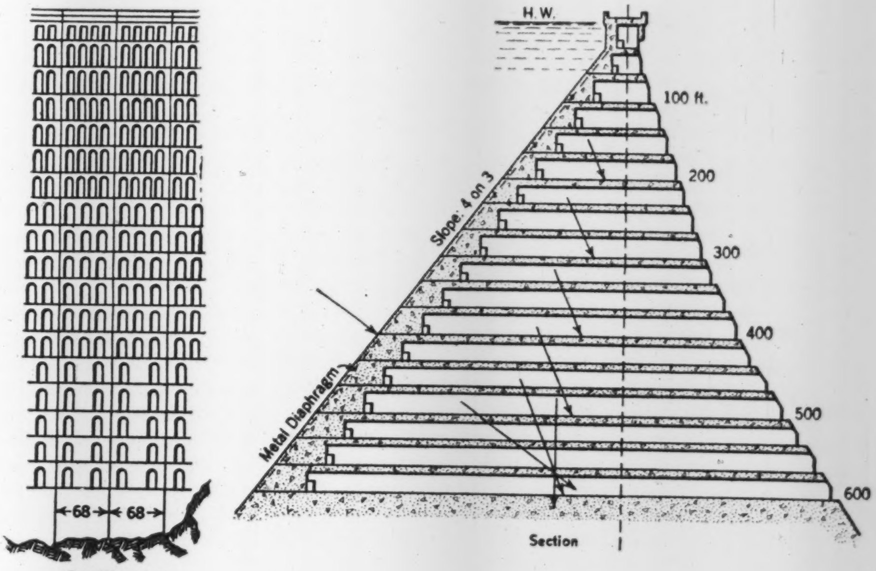
Honeycomb Gravity Dam Proposed

Cellular construction with horizontal drainage cells suggested for economy and safety—Inclined water face, metal watertight membrane and block construction are other features

A CELLULAR gravity-dam design is advanced by C. E. Grunsky, of San Francisco, past-president of the American Society of Civil Engineers, to meet the demands for improved safety and economy of dam construction that have been active especially since the St. Francis failure (1929), the 500-ft. San Gabriel project (1929), and the 725-ft. Boulder Dam design now being put under construction. Mr. Grunsky calls it a "honeycomb gravity dam" (*Civil Engineering*, April, 1931). A typical drawing with horizontal cells is here reproduced, but the cells may be inclined upward in downstream direction, in which case the construction joints separating the successive tiers of cells are more nearly at right angles to the line of full reservoir pressure.

The essential of the design is the gallery or cell system. It saves material and drains the interior of the dam, and in addition affords cooling surface to dissipate the heat generated in the setting of the concrete. Each tier of galleries is separated from the one above by a full construction joint. Vertical construction joints, which Mr. Grunsky says should be continuous from top to bottom (current practice often provides more construction joints in the upper part than in the lower), divide the whole dam into relatively small blocks. Drain and inspection wells along the vertical joints are to be kept open for some years after construction and then filled.

To assure watertightness, a metal diaphragm is built in near the upstream face. Preferably, Mr. Grunsky would incline this face of the dam, in order to utilize the water pressure for stability and to keep the foundation load central, both of which effects tend toward economy. His design is not limited to this feature, however, but may have a vertical upstream face. In either form the cell size and spacing would be varied so as to provide smaller cell area and more concrete area at the base than at the top.



Part Elevation

Section

Honeycomb construction for a gravity dam
Proposed by C. E. Grunsky to reduce shrinkage effects, drain away internal water and save material. In an alternative design the drainage cells are inclined upward in downstream direction.

Wood Seats for Stadiums

Service records of 70 structures form a basis for conclusions on species and grades of wood, decay and wear, paint and preservatives, and types of fastenings

Economic Loss in the use of wood for seats on such exposed structures as stadiums can be reduced materially by care in the selection and treatment of the wood, in the design of supports and fastenings, and in the maintenance of work. This article reviews conditions and experiences in numerous structures and outlines good methods and practice for the interests of their owners and the general conservation of lumber. —Editor.

By R. M. WIRKA
Associate Engineer, Forest Products Laboratory, Madison, Wis.

Wood is the material most generally used for seats in stadiums, grandstands and bleachers, but little information has been available as to the serviceability of wood when so used. Information obtained regarding 70 structures widely distributed geographically is summarized in the present article; and although most of these are comparatively new, a number of helpful conclusions may be drawn. An example of bad conditions is the small structure shown in Fig. 1.

Kinds of Wood—Douglas fir, redwood and southern cypress are used for seats in 75 per cent of the structures, with fir in the majority. Other species include Southern and Western yellow pine, Eastern spruce, oak, chestnut, Western larch, Eastern fir and pine (species not indicated). The record shows Douglas fir for 26 structures in sixteen states; redwood, thirteen structures in nine states; and Southern cypress, twelve structures in ten states.

Grades of Wood—Yard lumber, which is the class used for seats, is divided mainly into select and common grades, the former admitting only a few small knots and other minor defects. Of 58 structures 75 per cent used select lumber. Only a little trouble was reported with No. 1 grade common lumber, and for some species this grade appears suitable where there is a solid substructure, such as a concrete stadium. With skeleton framing of steel or wood, lumber of a select grade should be used, as severe personal injury may occur if a seat or footboard breaks.

The tendency of knots to bleed resin and the difficulty of maintaining paint on them makes the use of even No. 1 common lumber doubtful with resinous woods, and in non-resinous woods the paint or other coating does not stand so well on the knots as on the clear wood. However, knots of less than $\frac{1}{2}$ in. diameter do not usually cause trouble in either kind of wood.

Edge-Grain and Flat-Grain Lumber—In most cases both these kinds of lumber were used for seats, but out of 55 structures thirteen used only edge-grain lumber. This latter shrinks and swells less with moisture changes; it shows less cupping, warping and checking, does not splinter so much, wears more evenly and holds paint more satisfactorily. Loosening and splintering in flat-sawed boards can be reduced by laying them with the bark side up, Fig. 2, which side also holds the paint better than the pith side. In this position they have a tendency to become concave on top, but this can be prevented or lessened by keeping the top and edges well protected with paint or varnish.

Board and Slat Seats—Seats of single boards were used in 72 per cent of the structures, mainly 2 in. thick and 8, 10 or 12 in. wide, although 1-in. boards were reported in a few cases. Slat seats have sometimes three slats 2x3 or 2x4 in., or 2x3-in. and one 2x4-in. slat. With four or five slats they are $1\frac{1}{2}$x2 in. The spaces between slats range from $\frac{1}{8}$ to $\frac{3}{4}$ in.

Wide boards, when maintained in good condition, are more comfortable and generally cost less than slat seats, while the painting should also cost less. On the other hand, slats properly supported and fastened will not check, cup or twist so much as boards of the same quality. More breakage is likely with slats, but the cost of replacements is probably less with slats than with boards. Wide boards may hold water in pools, which is not only disagreeable but may contribute to decay, especially at joints and holes. The upper edges of both boards and slats are usually chamfered or rounded, thus improving the drainage besides reducing the splintering and wear.

Decay—Resistance to decay or rot of wood seats depends upon such factors as species, climatic conditions, type of construction, preservative treatment and percentage of heartwood and sapwood, the former being the most resistant. Decay was reported in fourteen of the 70 structures, most of which used both heartwood and sapwood. It is safe to say that the latter was an important factor in the decay. Under conditions favorable to decay the heartwood of Southern cypress and redwood is durable, while that of Eastern spruce, Eastern fir, red oak and Western yellow pine is more susceptible to decay. In Douglas fir, Southern yellow pine, white oak, chestnut and Western larch the heartwood is of intermediate resistance to decay. In all species the sapwood rots quickly under conditions favorable for decay.

Seat Supports and Fastenings—The type of support and methods of attaching the seats to them are important factors in the serviceability of the wood. In Fig. 3 sketches A to F and J are typical for concrete substructures; and sketches G, H and K for steel or wood substructures. Through bolts or screws are used in A, C, D and G. In some stadiums the heads of bolts or screws were countersunk and sealed with putty, but as the putty shrinks in drying it may separate from the wood, break the seal and permit the entrance of water, which usually cannot drain away and so causes decay and corrosion. At a concrete stadium in Massachusetts seat boards are laid loosely on the concrete during the football season and then removed to storage.

Decay at seat fastenings and corrosion of fastenings was reported at four stadiums; one used nails, one had screws driven from the top, and two had through bolts. Decay is more apt to occur at fastenings driven from the top than at those driven from the bottom, as in B and F of Fig. 3. Through bolts may be more effective in holding power if the wood does not decay, but there are no complaints of loosening with fastenings driven from the bottom. Carriage bolts used without countersinking appear to be the best form of bolt fastening. With few exceptions the board seats are laid flat or level, but it is suggested that they be laid with a slight pitch downward to the rear to give quick drainage.

Joints and Contact Points—Contact areas are vulnerable for decay and should be designed for drainage and ventilation. In sketch H, Fig. 3, the footboards butt together tightly and are in contact with the guard board, but the design at K is better, as spaces are left between the members. In most cases the ends of boards or slats butt together tightly, and sometimes the joints are puttied; open spaces are left in some cases, and a few use scarf joints. It is desirable to leave at least ⅛ in. between slats or boards so that any moisture absorbed through the end grain may evaporate quickly. Square ends are preferable to scarfed ends because of the smaller area of end grain exposed.

Protective Coatings—Most of the structures had coatings of some kind, including coal-tar creosote, linseed oil, linseed oil and turpentine, cement-base paint, oil stain, shellac followed with paint, varnish, lead paint, zinc paint, deck paint and china wood oil. Renewal of the coatings ranged from one to five years or longer. The only one of these materials that can be depended upon to increase the decay resistance of wood seats is coal-tar creosote, but oil-stains that contain creosote may have some effect if a thorough brush or spray application is made.

Paint, varnish and similar coatings are not effective against decay, and under conditions favorable to decay wood so treated cannot be expected to last much, if any, longer than unprotected wood. In fact, the coated wood may decay even more rapidly if the coating prevents free drainage of water or retards the drying out of moisture that has entered the wood. However, these coating materials, when maintained in good condition, will protect wood against weathering, which is due primarily to repeated swelling and shrinkage caused by moisture changes at or near the surface, while the interior remains at relatively uniform moisture content and volume. This action results in a slow breaking down and wearing away of the surface fibers, accompanied by raising of the grain, cupping, checking, cracking, splintering and splitting. Weathering, as distinct from decay, includes also the action of frost, rain, hail and wind, and also the chemical changes caused by light, moisture and oxygen.

In a Connecticut stadium built in 1914 the seats when erected were treated with china wood oil. Later a gray deck paint was used, and more recently a lead and oil paint has been applied every three years. None of these have prevented weathering, no doubt because they were not renewed frequently enough, but an annual coating of lead and oil paint is now proposed. A two-year painting program at a Colorado stadium has not proved effective against weathering. Trouble reported in getting paint to stick is probably due to early wearing of the paint from the summerwood bands rather than to original failure of the paint to stick to the wood. Trouble with paint flaking and chalking has been experienced in several stadiums. All these difficulties can be remedied probably by more frequent painting.

From paint exposure tests on panels made at the Forest Products Laboratory, it appears that for wood seats a good lead paint or lead and zinc paint should give satisfactory weather protection. Frequency of application is dependent upon the wood species and climatic conditions, but in view of the severe service and exposure it is recommended that a single coat be applied annually, or at least biannually, to lessen warping, checking and splintering.

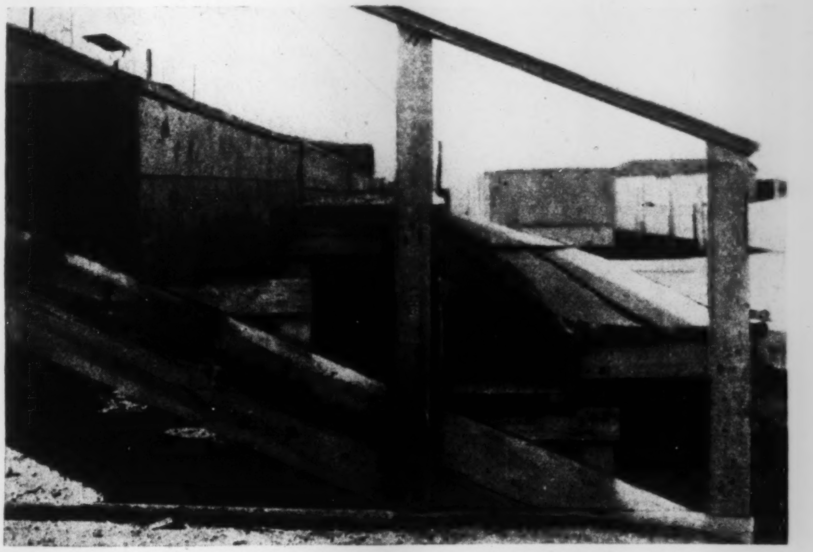


Fig. 1—Weathering of unpainted wooden stand in New Mexico

To retain the natural appearance of wood, a good spar varnish or similar coating may be used. Natural-wood finishes now in common use are not so durable as good lead or zinc-lead paints and are therefore more expensive by requiring more frequent renewal; but transparent finishes that are more weather resistant may become available in the future. Linseed oil is not so effective as good spar varnishes or oil pigment paints, probably because the linseed oil is mostly drawn into the wood and leaves little or no protective coating on the surface.

Preservative Treatment—Treatment of seats by toxic preservatives was reported in only four structures: (1) pressure treatment with zinc-chlorides; (2) coating every other year with creosote, probably by brushing or spraying; (3) treatment with a colorless preservative, no details of which were furnished; (4) treatment with creosote, but no details given. The first three structures have not been in service long enough to determine the effectiveness of the preservatives. The fourth is a small Massachusetts structure built in 1915, the seats of which were said to be in good condition after fourteen years' service due to the preservative treatment and to the structural design which permitted air spaces wherever possible.

In some cases linseed oil, or linseed oil and turpentine, applied by brushing, dipping, boiling or soaking, were mentioned as preservative treatment, but neither of these materials is a wood preservative. Linseed oil has little or no toxicity to the fungi that cause decay; and while turpentine is toxic, it is volatile and soon leaves the wood.

Preservative treatment is economical only if the annual maintenance charges against the treated seats are less than those for untreated seats. With boards of heartwood of a species of high resistance to decay there would be little if any saving, but with mixed heartwood and sapwood or with species of lower decay resistance the increased life should effect appreciable savings in annual costs.

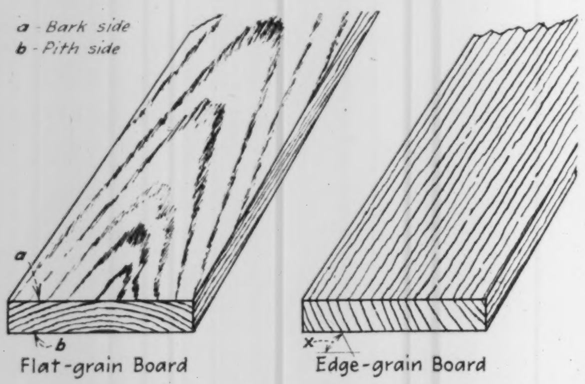

a - Bark side
b - Pith side
a
b
Flat-grain Board
x
Edge-grain Board

Fig. 2—Edge grain, or flat grain laid bark side up, is best

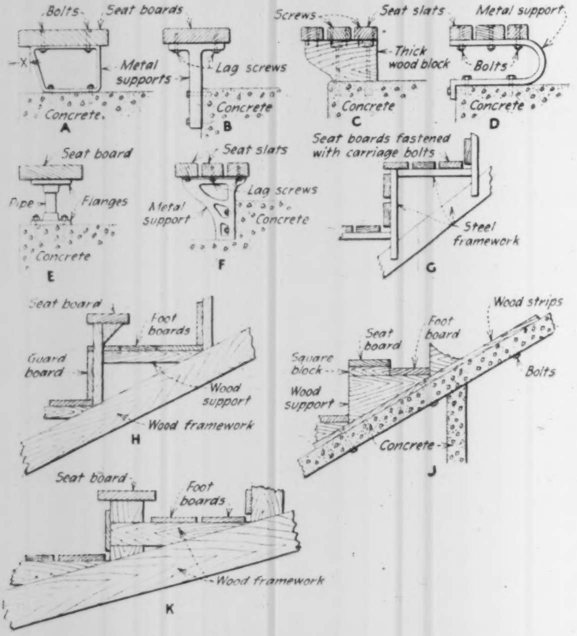

Bolts
Seat boards
X
Metal supports
Concrete
A
Lag screws
Concrete
B
Screws
Seat slats
Thick wood block
Concrete
C
Metal support
Bolts
Concrete
D
Seat board
Pipe
Flanges
Concrete
E
Seat slats
Lag screws
Metal support
Concrete
F
Seat boards fastened with carriage bolts
Steel framework
G
Seat board
Foot boards
Guard board
Wood support
Wood framework
H
Wood strips
Seat board
Foot board
Square block
Wood support
Bolts
Concrete
J
Seat board
Foot boards
Wood framework
K

Fig. 3—Supports and fastenings for wood seats

Water-borne preservatives are better than creosote for this purpose, as the former are scarcely noticeable after the water has evaporated. Creosote cannot readily be painted and is apt to bleed and so cause damage to clothing, unless only very small quantities are applied, as by brushing or spraying. But superficial treatment by dipping, brushing or spraying is not nearly so effective as pressure treatment. Wood treated under pressure with most salt preservatives can be painted so that the salt will not damage clothing. Such treatment with zinc-chloride in 1931 is estimated to cost from $10 to $20 per 1,000 b. feet. Many other water-borne preservatives probably would fall within this range.

Slivering, Loose Grain and Pitch—Slivering has occurred in both coated and uncoated seats. It can be avoided largely by keeping the paint or other coating in good condition. Apparently this was not done with the coated seats reported as silvering. Grain loosening, reported in a number of cases, is most likely to occur with flat-sawed lumber and on its pith face; it may occur also on the corners of both edge-grain and flat-grain lumber and on the edges of the former. It is more apt to occur in species with pronounced alternate hard and soft bands, such as Southern yellow pine, Douglas fir, Western larch and Southern cypress. It can be reduced or prevented by maintaining a good protective coating and by laying boards with the bark side up, except that edge-grain boards with the grain vertical may be laid with either side up.

No trouble is reported with natural coloring matter leaching from the wood.

Resin or pitch exuding occurred at seventeen structures. In a Wisconsin case this was so extensive that $\frac{1}{2}$-in. boards were screwed to the seat boards, but the new thin boards warped so badly that the remedy was not satisfactory. Of the species used for seats, only Southern and Western yellow pine and Douglas fir contain resin in appreciable amounts. If highly resinous species are to be used, the trouble may be reduced in the following ways; (1) use kiln-dried lumber or lumber treated with water-borne preservative under pressure, as the temperatures reached will bring the resin to the surface, where it hardens and may be removed by planing; (2) if lumber so treated is not used, reject pieces that are noticeably resinous or pitchy or, if they are pitchy on one side only, lay that side down.

Unseasoned Wood—The use of green or wet wood has resulted in cupping, grain raising, bowing, twisting and checking of the boards and pulling of the fastenings. In a California stadium the cupping and grain raising were so bad that after three years it was necessary to plane the tops of the seats. The wood should be air-seasoned or kiln-dried to a moisture content suitable for that of the local atmospheric conditions.

Strength Properties—The important strength properties in wood for seats are bending strength, stiffness, hardness and shock resistance. How the species rank in this respect is shown in the accompanying table. The figures given apply only to clear wood; for other material the strength would depend principally upon the defects present. Values are shown for longleaf and shortleaf pine separately, rather than an average for the species sold under the commercial name of Southern yellow pine.

Breakage occurring at the edges of boards, as at some stadiums, is due probably to excessive overhang, large checks or severely cross-grained lumber. Boards in which the grain deviates from the straight by more than 1 in 12 should be rejected. Overhang, as marked X on sketch *A* in Fig. 3, should be as small as possible.

Summary

The following general conclusions and suggestions are based on reports of 70 structures and on various tests and experiments at the Forest Products Laboratory, supplemented by field experience and service records:

1. Edge-grain lumber will stay in place better, wear longer and more evenly and hold paint better than flat-sawed lumber, but it costs more than mixed-edge and flat-sawed lumber. Its advantages must be weighed against its increased cost.
2. Flat-sawed seat boards should be laid with bark side up, as this holds paint better and there will be less

AVERAGE STRENGTH PROPERTIES OF TIMBERS
(FOR CLEAR WOOD ONLY)

Species	Composite Strength Values — Comparative Figures[1] Bending Strength	Stiffness	Hardness	Shock Resistance
Chestnut	68	112	50	69
Cypress, Southern	79	136	52	76
Douglas fir (coast type)	90	181	59	81
Douglas fir (inland empire type)	80	159	58	72
Douglas fir (mountain type)	75	142	52	67
Fir, white[2]	72	141	41	66
Larch, Western	89	153	64	81
Oak, commercial red	101	168	103	139
Oak, commercial white	99	149	109	125
Pine, longleaf	106	189	76	103
Pine, shortleaf	97	170	68	111
Pine, Western yellow	65	112	41	58
Redwood	90	134	59	70
Spruce[3]	71	136	42	71

[1] From U. S. Department of Agriculture, Technical Bulletin No. 158.
[2] Average of four species, A. Grandis, A. Nobilis, A. Amabilis and A. Concolor.
[3] Average of red, white and Sitka spruce.

slivering and grain loosening. The tendency of the upper side to cup can be reduced by keeping the seats covered with a good weather-resistant coating.

3. Unless the wood is given a preservative treatment, use an all-heartwood grade or eliminate all sapwood. In any species the natural decay resistance is in the heartwood, while the sapwood is of low resistance.

4. Renew protective coatings frequently enough to prevent serious weathering of the wood. A good lead paint or mixed pigment paint applied annually, or at least biannually, should give sufficient weather protection. Varnish and similar coatings usually must be renewed more frequently and cost more than paint. Neither paint nor varnish will prevent decay.

5. Design and build the structure so that water can drain quickly from all wood members, particularly at points of contact, and so as to insure maximum ventilation. Contact areas between wood members should be avoided wherever possible.

6. Chamfer or round the top edges of seat board or slats to reduce wear and splintering and assist drainage.

7. Give the seats only a small overhang, so as to reduce breakage. Eliminate boards with cross-grain having a slope of more than 1 in 12.

8. Avoid pitchy or obviously resinous boards. Kiln-drying or preservative treatment at high temperatures, followed by surfacing, are beneficial in reducing pitch exudation, but do not always provide complete insurance against it.

9. Seat fastenings driven from the under side will reduce the decay hazard. Through bolts are stronger but increase that hazard.

10. Consider the use of wood treated with a chemical preservative. Water-borne preservatives are probably more suitable than creosote because most of them do not discolor the wood, have no odor, and the treated wood can be finished or painted like untreated wood.

11. The select grades of lumber provide better seating material than common lumber but cost more. The common grades of some species are satisfactory when used on a solid substructure.

12. Slat seats will probably hold position better than one-piece board seats.

13. Avoid wet or green lumber. Use lumber kiln-dried or air-seasoned to a moisture content suitable for that of the local atmospheric conditions. A moisture content of 12 to 15 per cent generally should prove correct.

Six Months of Job Hunting

An Autobiography

How to make a living has been the immediate problem of many an engineer in recent months, due to sharply decreased construction prospects. For the salaried engineer it became the simple question of holding his job or finding a new one. The following story is an unvarnished account of one individual experience, lifted from a personal letter received only a few days ago. It is printed as a convincing presentation of the need for professional cooperation in the attempt to stabilize engineering employment. The writer of the account fortunately found a job shortly after writing the letter; many others have not.

—EDITOR.

IT WAS the first of November. Typewriters could be heard—rapid, continued, staccato—behind the light partitions; voices, now emphatic, now defensive, rose from several parts of the room where impromptu lively conferences went on over a tracing; two men were laughing with a sales engineer over a new joke. I looked up from my figuring and put down the slipstick to answer the phone. The secretary of the department requested my presence in the Chief's office. I wondered what new assignment was ahead.

The Chief came right to the point. There were to be no more new assignments. I was to take a month's vacation with pay—my last. The idea simply did not penetrate. We were at the peak of the designing, and every seat in the drafting room was occupied. The project was going ahead like a house afire, with some engineers and draftsmen working four nights a week. However, no new work was in sight, and our department staff had been increased for peak production. As a new member with a record of a little more than a year's service I was among the first to be released.

Fired—somehow it didn't seem reasonable. The company was so large, and my experience and education were broad enough to cover the structural, construction, hydraulic and estimating departments, not to mention drafting. Could I be transferred to another department until things picked up in our own? "No, other departments are in the same condition."

A year before I had cheerfully assumed the burden of moving from one city to another. The very size of the organization seemed to insure unlimited possibilities and stability; also, the numerous interviews had seemed to indicate a decided interest on the part of the company in my development. I decided to take it like a good sport and hustle around for another connection.

* * *

THE BIGGER power companies were on my first week's list. I was received courteously by the head of the firm or the chief engineer, but in each office the story was the same. They were either preparing to release their men as contracts were completed or were looking for means to keep their own staff intact. Gradually the word "depression," used so freely in the newspapers, began to acquire some meaning.

The following week the company wrote letters for me to Cleveland, Philadelphia and Chicago. By now I was prepared to move once more if a job should appear elsewhere. But the letters brought no result.

It was suggested that I try Boulder Dam. I knew that every unemployed engineer in the country was looking in the same direction and that many were already in Denver or Las Vegas. And there were the prohibitive moving costs for a family. How about the large public works near home? The Metropolitan District water-supply commission could not expand until its case was settled in the courts—after the first of the year.

Next I tried the structural offices and contractors. Drafting rooms were empty, and there was no chance for me. But I was assured everything would change after the first of the year.

The newspapers at this time printed long columns about the President's emergency committee for employment. Prominent names appeared, so I wrote hopefully to Washington for information about emergency measures. In the reply I was informed it would be necessary to pass a civil service examination for any federal position, and I was referred to another bureau for such information. I wondered what the term "emergency" meant to Washington.

* * *

By the third week I had the sensation of being trapped. This had been my first job in Boston; my previous contacts were all in New York. Perhaps the home town would be kinder. My friends in the profession wrote that conditions there were worse, but it was better to dig up the facts for myself. So I took the train down. I visited offices for a week.

New subway contracts were about to be awarded. Everybody anticipated a change the first of the year. In fact, I was told to get in touch with one office in a few weeks. The better-known firms were keeping their organizations intact with no intention of "letting their engineers out to starve." The prevailing atmosphere was expectant and quite hopeful. At Boston, when I returned for my last week in the office, I heard about new reductions throughout the organization and the same thing in other companies. I dispatched my chattels to a warehouse and departed from the New England metropolis.

A glance at New York's ever-new skyline invited optimism. After all, hadn't there always been a demand for structural-steel designers? I set out cheerfully on my fifth week's hunt.

I was received courteously. "Business will pick up after the first of the year." The structural offices, subway contractors, foundation men, steel detailers, public utilities—all were willing to interview, but there was no work ahead. The few contracts awarded had been snapped up largely to provide work for men who were idle but who had been kept right along on the payroll. I was good-naturedly advised to sell apples.

I filed an application with the Port of New York Authority, even bringing a letter from one of the commissioners. It turned out, however, that letters were common these days; the engineering department was swamped with applications, and mine was only one, the latest one, of a long list. The board of water supply was my next try; then the board of transportation and the department of plant and structures. In ordinary times it had been possible to get an occasional temporary appointment until an examination was held. But there had been no turnover for some time, and hundreds of applications were on file ahead of mine.

While talking to a friend over the phone I said jokingly, "The streets feel quite cold under the feet." He said, "Come in and we'll give you newspapers for your shoes." His actions were more practical, for he offered me several weeks' work on some population studies. It was at exactly half the hourly rate I had been getting, but I was glad to get it. It saved going around in snowstorms. In the meantime, I took advantage of the generous offer of a professional society and inserted an ad in the columns of "Men Available." The outlook in that direction was bleak; there were dozens of other ads similar to mine appearing each month. No results developed.

* * *

The "first of the year" was past. It was now in the middle of February. Newspapers reported a revival of business here, there and the other place. I started the list all over again.

Everybody was reassuring. There had been a slight upward trend in steel orders; you could almost hear the profession in unison sighing in relief. But by the first of March we realized that the rejoicing had been premature. Organizations that had been kept together at a great loss during the winter began to disintegrate. Contractors reported that there were no jobs to be estimated. Heads of firms, restive under the strain, took long vacations in Florida or California, expecting to come back to start business with a rush.

Almost three months of unemployment had reduced my savings to the vanishing point. I realized that newspaper propaganda had kept me from getting a sufficiently early appreciation of the grave conditions in civil engineering. The employment bureau for professional men had had no demand for structural designers, a situation unparalleled in previous depressions. With my fifth college reunion approaching I found that my services had absolutely no sales value, regardless of price, and that recommendations from leading engineering firms also were of no help.

I walked through the Wall Street district, which at this time of the year should have been echoing to the impact of metal on metal as steel sheeting is driven down, the air clouded with dust from the demolition of veteran buildings, riveting resounding from above. There wasn't a sign or sound of it. Underneath was the new subway, to whose planning I had contributed my small share. Around me were several friendly skyscrapers, whose detailed anatomy was more familiar to me than my own.

* * *

As April approached the only escape remaining was to abandon engineering entirely for the time being, in order to live. I made the round of business offices, statistical bureaus, the retail stores.

The mere fact that I had been quite successful and had attained a high salary level spoiled several opportunities. People said I was wasting my time; some seemed to be afraid that I would leave promptly when the profession was once more on its feet. Commercial agencies for positions of all kinds were deluged with people clamoring for work. I had waited too long.

* * *

April is now well along. If my experiences are a guide, the situation is getting worse rather than better. One good thing: There is a tendency on the part of each industry to take care of its own; the financial district, for example, has set up a free employment bureau to aid the white-collar man. But what have the professional societies and the government done for the engineers?

The newspapers continue to report improved conditions. Such agencies as the American Institute of Steel Construction give us figures on this year's increased steel tonnage as compared with last year's. They may be right, but my search does not confirm it. I continue the round of offices, hands in empty pockets, and find no work. —*B.S.*

New York, April, 1931

Taste and Odor Tests of Paints for Water Tanks

Of seven paints, only one gave no taste and odor in laboratory tests with chlorinated water, hot and cold

By GEORGE L. HALL
Division Engineer, Bureau of Sanitary Engineering, Maryland State Board of Health

TESTS have recently been made of seven types of paint for the interior of water tanks at the Maryland state board of health in an effort to find one which would not impart tastes and odors to chlorinated water.

During the past three years the bureau of sanitary engineering of the department has erected at state institutions four elevated storage units ranging in size from a 100,000-gal. tank on a 50-ft. tower to a 250,000-gal. tank on a 100-ft. tower, including a 150,000-gal. standpipe. Special attention was given to the kind of paint to be used on the interior of the tanks on account of the occurrence of disagreeable tastes and odors that were imparted to the water in a standpipe erected eight years ago by the bureau.

In this earliest instance the water was filtered and chlorinated and was pumped to the storage unit, from which it flowed by gravity to the distribution system. No special kind of paint was called for in the specifications, the only stipulation being that "the standpipe shall be given one field coat of approved paint both inside and outside."

As soon as the standpipe was placed in service complaints were received regarding tastes and odors in both the hot and cold water supplies. The water was so objectionable that persons residing at the institution refused to drink it. This condition obtained for a period of several months, when the tastes and odors in the water finally disappeared.

Since that experience the specifications of the bureau for paint for the inside of storage tanks have been revised. They now read as follows: "The inside of the tank shall be given one coat of damp-droof paint of a kind to be approved by the engineer." Under this specification the bureau requires the tank contractor to submit samples of inside paint for laboratory tests to determine whether the paint will impart tastes and odors to the water.

These tests are carried on in the following manner: A clean metal vessel is painted inside with the paint to be tested and allowed to dry thoroughly; tap water, distilled water and water containing various amounts of chlorine are allowed to stand in the vessel for 15 min., then poured off and the water tested for tastes and odors, both hot and cold.

The results of recent tests are given in the accompanying table. The paint finally selected is Detroit No. 827. The emulsion asphalt would be satisfactory from the standpoint of tastes and odors, but the paint is very viscous and would probably have to be applied hot to cover satisfactorily the metal surfaces. The paint selected has been used on two elevated tanks erected this year. While the water supplies are chlorinated, no complaints have been received regarding unpleasant tastes or odors. Our experience indicates that most paints having a coal-tar base give objectionable tastes and odors to the water coming in contact with them. These tastes and odors are more noticeable and their intensity is increased when the water has been chlorinated, according to the results of our tests.

The writer wishes to express his appreciation to Abel Wolman for his helpful criticisms. Acknowledgment is also made to the bureau of chemistry of the state department of health, where the tests were made under the direction of the late Dr. W. W. Randall, chief of the bureau.

TASTES AND ODORS IN COLD AND HOT WATER LEFT IN VESSELS PAINTED WITH VARIOUS SAMPLES

		Red Lead No. 6761	Unchromated Emulsion Asphalt	Varnish	Asphaltum Varnish Japco	Asphaltum* Varnish Japco	Asphalt Varnish Spec. F16035	Detroit Black Paint No. 827
Tap water								
Odor—	cold	musty	none	none	none	none	creosotic	none
	hot	musty†	none	none	none	none	cresosotic	none
Taste—	cold	biting	none	biting	biting	biting	biting	none
	hot	biting†	none	biting	biting	biting†	biting	none
Distilled water								
Odor—	cold	musty	none	none	none	none	creosotic	none
	hot	musty†	none	none	none	none	creosotic	none
Taste—	cold	musty	none	biting	biting	biting	biting	none
	hot	musty†	none	biting	biting	biting†	biting	none
Water—0.1 p.p.m. chlorine								
Odor—	cold	musty	none	none	none	none	....	none
	hot	musty†	none	none	slight	none	....	none
Taste—	cold	phenolic	none	biting	biting nauseating	biting	....	none
	hot	phenolic†	none	biting†	biting nauseating†	biting†	....	none
Water—0.3 p.p.m. chlorine								
Odor—	cold	musty	none	slight	none	none	none	none
	hot	musty†	none	slight	slight	none	phenolic	none
Taste—	cold	metallic	slight phenolic	nauseating	biting nauseating	biting nauseating	nauseating	none
	hot	metallic†	slight phenolic	nauseating	biting nauseating†	biting nauseating†	nauseating	none
Water—0.5 p.p.m. chlorine								
Odor—	cold	musty	none	slight	none	slight musty	none	none
	hot	musty†	none	effect incr. still faint	slight	slight musty†	creosotic	none
Taste—	cold	biting metallic	slight phenolic	nauseating	strong biting	nauseating phenolic	nauseating biting	none
	hot	biting metallic†	slight phenolic	nauseating†	strong biting†	nauseating phenolic†	nauseating	none
Water—1.0 p.p.m. chlorine								
Odor—	cold	....	....	....	slight	....	creosotic	.....
	hot	....	....	....	more marked	....	phenolic	.....
Taste—	cold	....	....	....	biting nauseating	....	nauseating	.....
	hot	....	....	....	biting nauseating†	....	nauseating biting	.....

*Same as (4) after can had been allowed to stand exposed for about one week.
†Means effect increased over cold sample.

British Government Aids Home Builders

Subsidies granted by the government aided in the construction of a total of 770,088 houses in England and Wales during the period 1924-1930, according to information received by the U. S. Department of Commerce. Of this number 401,833 have been built by local authorities and 368,255 by private enterprise. The policy of subsidizing construction, inaugurated after the war to relieve a housing shortage, provides approximately $45 per house per year over a 40-year period for houses in non-agricultural districts and $62 in agricultural districts.

A Modern Slag-Crushing and Sizing Plant

Seven slag sizes produced simultaneously and stored separately—Controlled discharge from any chosen number of bins proportions desired grading of slag—Three separate processes remove iron

By E. J. WINKLEMAN
Chief Engineer, Duquesne Slag Products Co., Pittsburgh, Pa.

CRUSHED SLAG has undergone a process of selection and refinement for construction purposes which ranks it as one of the most carefully prepared of the materials with which the engineer works. The redemption by the steel mills of the former waste product of their blast furnaces has gone far beyond salvaging to the purposeful manufacture of a commercial product. The article which follows not only clearly indicates this major development in crushed-slag manufacture but emphasizes the detailed care exercised in controlling the product and specializing the sizes required for different purposes. Incidentally, the plant described exemplifies the most recent technique in equipment and operating procedure. —EDITOR.

THE LATEST ADVANCES in crushed-slag production are exemplified in a new plant of modern design recently completed at Pittsburgh, Pa. In order that the product shall successfully and economically meet the closely limited specifications now commonly applied to mineral aggregates, careful study was given to selecting the types of equipment; to the relative arrangement of parts to insure thorough screening and precise separation into the several sizes; and to means for recombining sizes to produce accurately any desired grading. The specification requirements of slag today are so diversified as to present problems of no small difficulty.

Location and General Arrangement

The plant is located in Pittsburgh, on a site bounded on one side by the Monongahela Connecting Railroad and the Monongahela River and on the opposite side by Second Ave.; it is adjacent to the Eliza furnaces of the Jones & Laughlin Steel Corp., from which the slag is obtained. The site provides convenient shipping by rail, highway or water.

The yard track system and the respective locations of each unit of the plant, including the slag pits, primary crushing unit, the conveyor through the tunnel, the screening plant and the storage piles, are shown by Fig. 1, which is a view of the entire project, and Fig. 2, which is the ground plan. The flow of material through the plant, from the time it is dug from the pits until it is loaded on railroad cars or motor trucks, is shown by the sectional views of Fig. 2. It will be noted by referring to the ground plan that a haul of only a few hundred feet is required for transporting the hot slag from the furnaces to the slag pits.

Slag Pits—The slag pits are really one large pit, with a ladle pouring track on each side of it, divided in the center by a track on which a car-haulage system operates for transporting the slag from the electric shovel to the primary crusher. The shovel has a $1\frac{3}{4}$-yd. dipper and digs down one side or half of the pit, while the opposite side is being poured with molten slag; this arrangement allows the slag to solidify and cool before it is dug. The shovel delivers the material into a 20-ton automatic drop-bottom hopper car, which has a travel of about 500 ft. (the length of the pits) and is operated by an electric haulage engine. The control push-button system for operating this engine allows the car to be stopped automatically at any predetermined point by the use of a pointer on a location dial graduated to a scale representing the length of travel of the car. After the car is loaded by the shovel and hauled up to the discharge end of the pit, the material is dropped automatically into a hopper, from which it is delivered by a plunger feeder onto an inclined pan conveyor, shown in Fig. 2. The first portion of this conveyor, which elevates the material

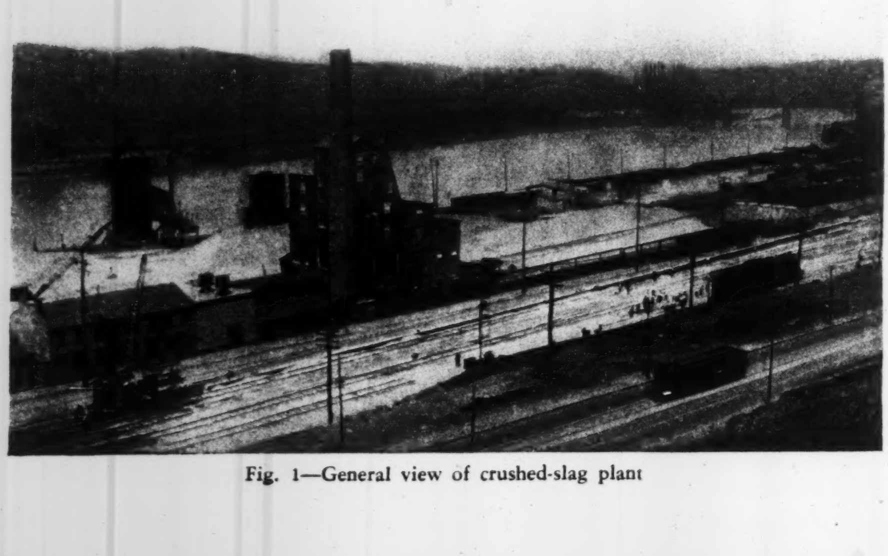


Fig. 1—General view of crushed-slag plant

to the primary crusher, is inclined; the upper part is horizontal to permit scrap iron to be picked out by a man stationed at this point. This scrap material is thrown directly into a railroad car alongside and below the picking portion of the conveyor.

Primary Crusher and Tunnel Conveyor—The 42x40-in. primary jaw crusher is shown in Fig. 3. It will be noted by reference to the ground plan (Fig. 2) that the slag pit and primary crushing units are separated from the screening plant by the main line of the Monongahela Connecting Railroad, as well as by several slag storage piles. The distance from the primary crusher to the screening plant (several hundred feet) required the construction of a conveying tunnel, in which is located a 30-in. belt conveyor. The tunnel is of 84-in. diameter precast concrete pipe. The tunnel was used in preference to an overhead conveying system to enable the locomotive crane and railroad equipment used for stocking purposes to operate without interference.

Secondary Crushing Unit—The tunnel conveyor delivers the material into a bucket elevator, which in turn discharges onto a scalping screen. The fines from the screen are bypassed directly into the main elevator, while the oversize is delivered into a 4-ft. cone crusher, which is the secondary crushing unit, shown in Fig. 5. The discharge from the crusher combines with the bypassed fines and enters the main bucket elevator on its way through the plant. This scalping screen, as well as all other screens in the plant, are of the vibrating type. To

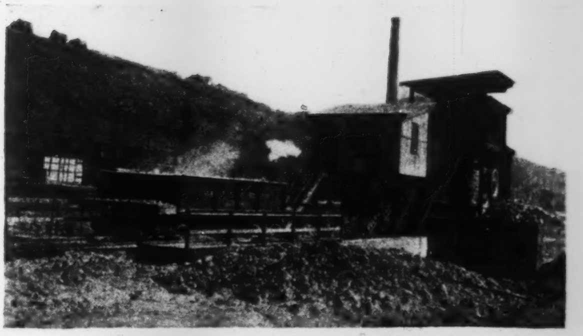


Fig. 3—Slag car and primary crushing plant

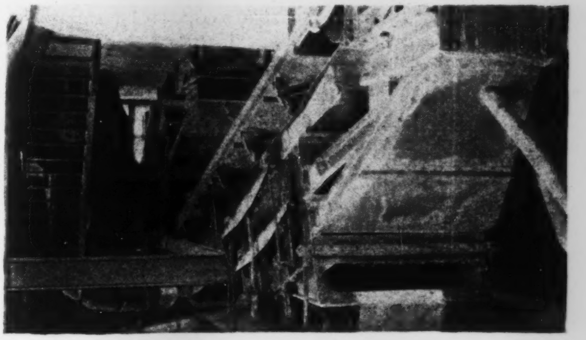
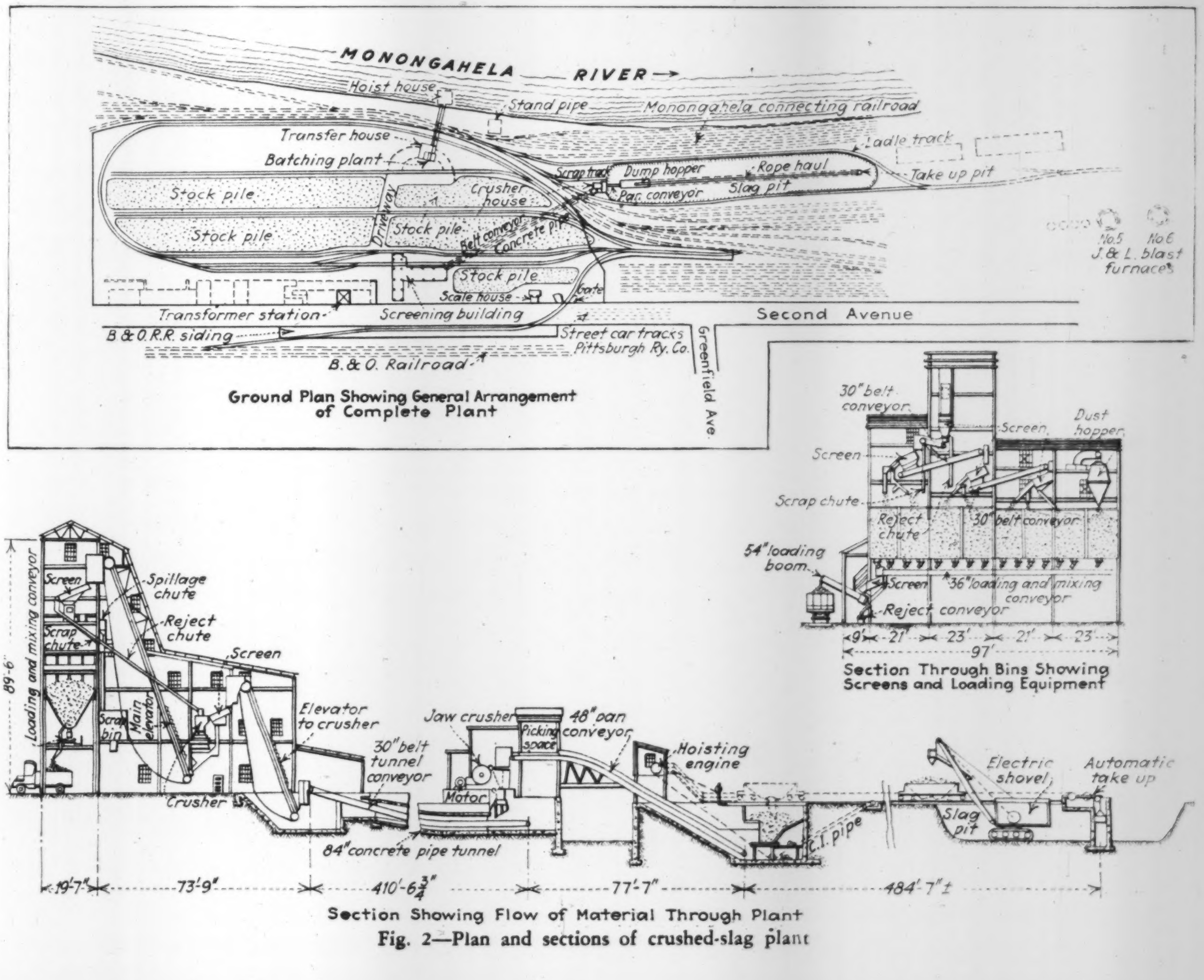


Fig. 4—One of the sizing screens


MONONGAHELA RIVER →
Hoist house
Stand pipe
Monongahela connecting railroad
Transfer house
Batching plant
Ladle track
Scrap track
Dump hopper
Rope haul
Take up pit
Pan conveyor
Slag pit
Stock pile
Crusher house
Stock pile
Driveway
Stock pile
Belt conveyor
Concrete pipe
No.5
No.6
J. & L. blast furnaces
Stock pile
Scale house
Gate
Transformer station
Screening building
Second Avenue
B & O. R.R. siding
Street car tracks Pittsburgh Ry. Co.
B. & O. Railroad
Greenfield Ave.
30" belt conveyor
Screen
Dust hopper
Screen
Scrap chute
Reject chute
30" belt conveyor
54" loading boom
Screen
36" loading and mixing conveyor
Reject conveyor
9'
21'
23'
21'
23'
97'
89'-6"
Loading and mixing conveyor
Screen
Spillage chute
Scrap chute
Reject chute
Screen
Scrap bin
Main elevator
Elevator to crusher
Crusher
30" belt tunnel conveyor
84" concrete pipe tunnel
Jaw crusher
Picking space
48" pan conveyor
Motor
Hoisting engine
C.I. pipe
Electric shovel
Automatic take up
Slag pit
19'-7"
73'-9"
410'-6¾"
77'-7"
484'-7"±

Ground Plan Showing General Arrangement of Complete Plant

Section Through Bins Showing Screens and Loading Equipment

Section Showing Flow of Material Through Plant

Fig. 2—Plan and sections of crushed-slag plant

eliminate fine material as far as possible, a scalping screen was installed at this point, so that the material already crushed fine enough by the primary crusher will bypass the secondary crusher. This arrangement also assists in getting maximum capacity of the crusher and reduces wear and power bills.

Screening Units—The main elevator discharges onto the main scalping screen located at the top of the building. The rejects from this screen are returned to the secondary crusher, while the undersize material is delivered onto a short belt conveyor having a magnetic head pulley for collecting any iron which was not picked out by hand before the material entered the primary crusher. The scrap iron collected by the magnetic separator is delivered into a bin located directly over a track for railroad cars. All of the material, after passing over the magnetic pulley, is delivered to a series of three double-deck vibrating screens used to produce the finished sizes. One of these screens is shown by Fig. 4. Two sizes are scalped off from each screen and delivered into the bins; and on the third screen the last or final size going through gives seven sizes of material that are delivered into the bins. Six of the sizes are very closely sized, but the slag sand is everything that passes through a $\frac{3}{16}$-in. square opening. In a majority of cases a graded size is required by the trade, and in order to control the grading accurately a loading and mixing conveyor installed underneath the bins is used for combining two or more of the sizes by feeding simultaneously from two or more bins.

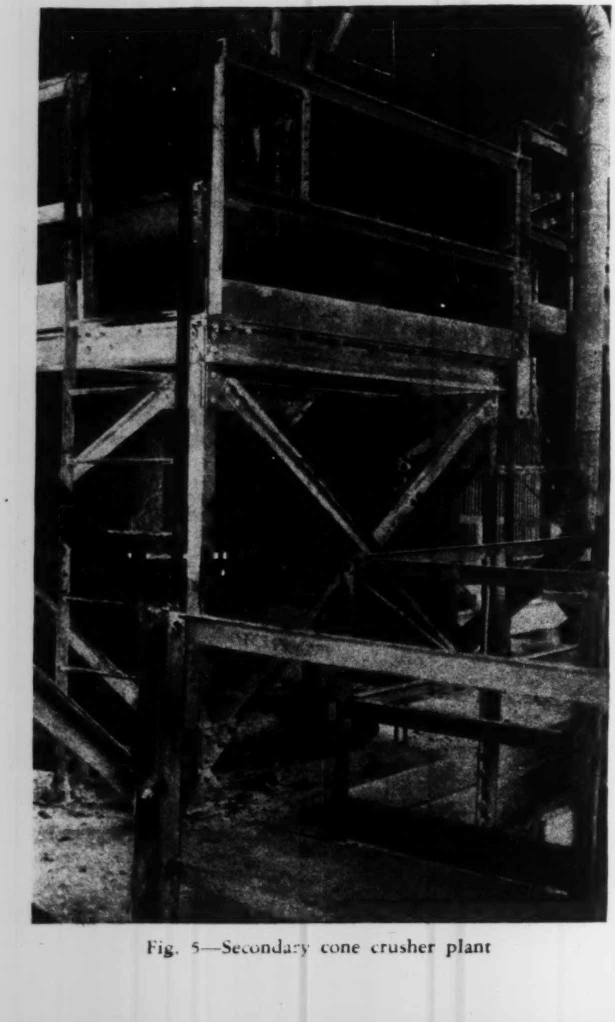


Fig. 5—Secondary cone crusher plant

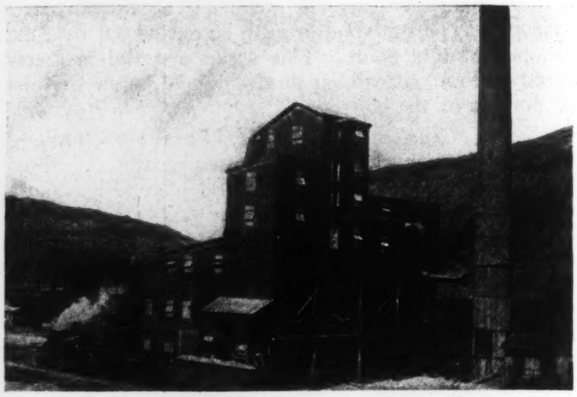


Fig. 6—Screening and loading plant

The plant is equipped with a complete dust-collecting system, connected with every vibrating screen, chute, elevator head and crusher. All screens are completely inclosed to make dust collection effective.

Bins and Loading and Mixing Equipment—The series of storage bins is divided into eight compartments, each one holding 75 tons. Seven of these compartments are used for all the material coming from the screens; the eighth is utilized for storing material received from the dust-collecting system. The 75-ton bins permit a full carload of material to be taken from a bin without entirely emptying it. It will also be noted that bag bottom bins are used, these being practically self-cleaning, which is a desirable feature if it is desired to change the size of material held in any one bin. It also permits full-capacity use of bins with no waste storage.

Two series of gates are located in the bottoms of the bins. One series is used for loading motor trucks, each bin containing one gate for this purpose and each gate having separate control. The truck-loading gates are located a little to one side of the center line of the bins. The other gates are located on the center line of the bins and discharge the material directly onto the loading and mixing belt conveyor. Each compartment or bin contains two gates. The opening and closing of all these gates is controlled from one point by a lever system, which allows the operator to open any number of gates simultaneously and to any degree desired, so that predetermined percentages of various size materials can be placed upon and mixed on the belt conveyor for producing the grading of sizes desired. This conveyor has a magnetic head pulley for rejecting any material containing iron which may have passed the magnetic pulley in the plant proper. With this arrangement it will be noted that all material loaded into railroad cars passes over two magnetic pulleys, thereby assuring the consumers of slag that the iron content will be practically nil.

The loading and mixing conveyor discharges onto a double-deck vibrating screen. This screen is used for removing any fines which may accumulate in the bins and provides the means for procuring a very close sizing when this is required. The fines, or undersize material from this screen, are discharged onto a belt conveyor, which returns them to the main-tunnel belt conveyor feeding the plant. It will be noted that with this arrangement the plant operates in a closed circuit, all fines or undersize material being returned to the bin holding that particular size.

The screen referred to discharges the material onto an inclined pan conveyor or loading boom. This loading boom discharges directly into the railroad cars, and at the head of it is located an oscillating spreader plate, which spreads the material uniformly over the entire width of the car, thereby preventing segregation of the finer size in the center of the car with the coarse material on the outer edges—which is normally the case when loading without this device. The screen is so arranged that all material, before being loaded into railroad cars, may be washed.

The loading and mixing conveyor is also used in loading motor trucks where a mixed or graded size is desired. To accomplish this, the belt conveyor is reversed, and instead of the material discharging over the head pulley, it discharges over the tail pulley, down a chute and directly into the truck.

Electrical Equipment

Much thought was given to the electrical arrangement of the plant. All motor-starting equipment, switches, control, etc., are located in a separate dustproof building situated about 80 ft. from the plant. Dust is thereby prevented from settling on the starting apparatus, which is frequently the cause of enforced shutdowns. All the motors have automatic starting equipment with push-button control, these buttons being placed in one row on a platform alongside the cone crusher for controlling the equipment in the main part of the plant. From this point the operator has a general view of the entire plant and can see practically every piece of equipment. He is, therefore, able to start or stop everything without moving from his location and in a very short period of time. All the electrical equipment is interlocked, so that, in the event that something goes wrong in one place, all equipment which is feeding material to the faulty member will stop automatically. This prevents clogged crushers and overloaded screens, elevators and conveyors. It also does away with the work, trouble and time required to clean up spills in the event of an accident to any piece of equipment. Furthermore, this interlocking arrangement prevents the premature starting of any other equipment until the faulty member is ready again.

Stocking and Yard

All material produced is loaded into motor trucks or railroad cars for shipment, or loaded directly into 35-yd. side-dump cars for stocking purposes. It will be observed on the ground plan that space is assigned for storing each size of material produced. The car is hauled to the proper storage space by steam locomotive and there dumped. A locomotive crane equipped with clamshell bucket is used to pick up the material from alongside the track and pile it. Two scales are provided for weighing all outgoing shipments, one for motor trucks and the other for railroad cars.

Calculating Floodflow

In the article "Calculating Floodflow Over an Embankment," in *Engineering News-Record,* April 2, p. 557, two errors occur. The coefficients in the fifth line on p. 558 should read: "ranging from 2.70 to 3.27." In the second column of the same page the sentence beginning on the fifteenth line should read: "For single-track and double-track trestles the head loss under the existing conditions was found to be $H = 0.08V^2$ and $H = 0.15\,V^2$, respectively."

New Series of Tests on Flame-Cut Wind Connections

Impact and static-bend tests fail to cause cracks on flame-cut edges—Planing edges after flame-cutting proved unnecessary—Other tests verified

By OTIS E. HOVEY
Assistant Chief Engineer,
American Bridge Co., New York City

THE SUBJECT of flame-cutting of structural details for wind connections for building frames has been one of considerable interest for several years. In 1928 the American Bridge Co. made and had tested at the Bureau of Standards six sample connections similar to those being used in a 44-story building in New York City, to determine whether wind connections flame-cut and then punched were superior to those punched and then flame-cut. The results (*Engineering News-Record,* Nov. 1, 1928, p. 666) did not show any difference between the two methods of fabrication.

Subsequently certain tests were made by Columbia University (publication No. 3, July, 1929), which were interpreted by their makers to indicate a risk of brittleness in pieces flame-cut after punching. As a result, the alleged damage by flame-cutting has been in controversy, and the American Bridge Co. determined to make another series of tests in order to develop more data in relation to the effects of various methods of fabrication.

The 1930 samples were cut from a single 24-in. 105.9-lb. I-beam of normal structural quality but rather softer than average. The samples were duplicates of flame-cut wind connections used in the Empire State Building in New York City, except that extensions having parallel sides were used beyond the theoretical ends of the tapered webs for convenience in testing. In each sample the pieces bolted together were cut from opposite flanges

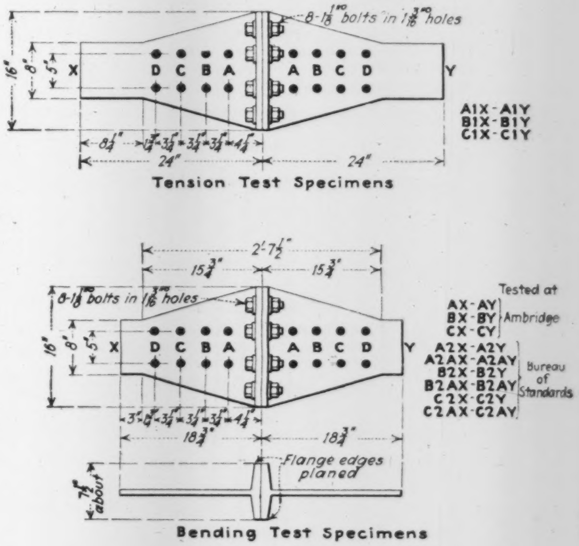


Fig. 1—Flame-cut test specimens

A specimen: holes punched, edges then flame-cut. *B* specimen; holes drilled, edges then flame-cut. *C* specimen; holes punched, edges then flame-cut and planed.

of the beam, designated by the letters *X* and *Y*. Fig. 1 shows the details of the three tensile specimens and also gives details of the nine samples which were subjected to transverse bending.

The method of fabrication is indicated by the first letter of the marks on the specimens: *A*, holes punched, edges then flame-cut; *B*, holes drilled, edges than flame-cut; *C*, holes punched, edges then flame-cut and finally planed off ¼ in.

Impact-Bend Test

Impace-bend tests were made in the company's shop at Ambridge, Fa. The three specimens listed in Fig. 1 were given a transverse test by dropping a 4,500-lb. hammer 12 in. One blow in each case was sufficient to drive the specimen down to the bottom of a die block with a resulting deflection of about 7⅜ in. on a span of 2 ft. The die side of the punched specimens and the burr side of the drilled specimens were on the lower or convex side of the bends. The greatest bending occurred in the holes nearest the flange; and cracks appeared at the die side of these holes in specimens *A* and *C*. The drill burrs had not been removed on the *B* specimens, and very minute cracks were visible in the burrs of the holes nearest the flanges. No cracks were visible in the edges of the flame-cut webs of any of the specimens.

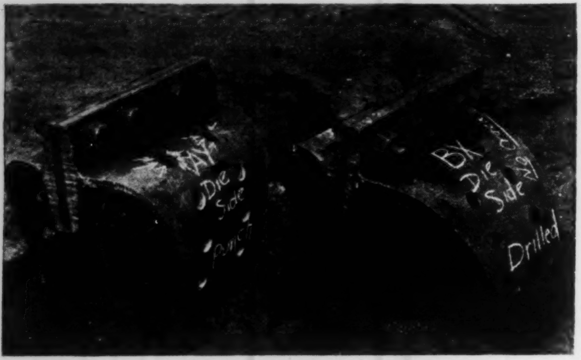


Fig. 2—Bend-test specimens

Extreme bending was produced in a press after the specimens had been subjected to an impact-bend test involving the dropping of a 4,500-lb. hammer 12 in.

The bending was continued in a press until the specimens were bent as shown in Fig. 2. There was very little change in the size of the cracks from the press bending, and no cracks were visible in any of the flame-cut edges.

Tension Tests

Tension and static-bend tests were made at the Bureau of Standards, Washington. The tension specimens were prepared by filing off all burrs flush with the surface of the webs, taking care not to round the edges of the holes. Tensile load was applied slowly, so that it was easy to observe either Lüder lines or cracks. The Lüder lines were first seen around and between the holes farthest from the flanges and then became visible successively at the other lines of holes. The fractures were good; they began at the sides of the holes and then progressed to the edges and middle of the specimens.

Static-Bend Tests

Static-bend tests were made as shown in Fig. 3. Loading began with a load of 2,000 lb. and increased until the yield point had been exceeded on each of the eightee 2-in. gage lines on each of the specimens. Then th samples were further bent to determine the load producing the first visible crack. Cracks appeared first in the holes nearest the flanges of the four samples havin punched holes. The cracks were in the die side of th holes in the small offset collars that are characteristi of holes punched in material about ⅝ in. thick. There were no cracks in the *B* specimens having drilled holes. None of the specimens was found to have cracked at the flame-cut edges.

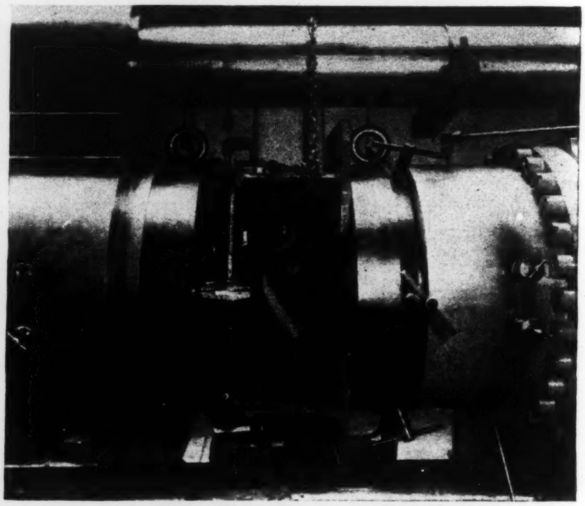


Fig. 3—Set-up for static-bend test

Finally, the specimens were set upright in the machine and squeezed together as bent columns. Cracks appeared in other holes; the greatest bending and largest cracks now occurred in the second line from the flange. With the exception of one very small crack in one of the holes of the *B* specimens no cracks occurred in the drilled holes. There were no cracks in the flame-cut edges of any of the specimens.

Summary of Results

1. The fractures started at the sides of the holes and not at the flame-cut edges.
2. All three specimens had about the same yield point.
3. The specimens with drilled holes had greater ultimate strength, elongation and reduction of area than those with punched holes.
4. Planing the flame-cut edges did not increase either yield point or ultimate strength.

The bending tests showed that:

1. No cracks occurred in any of the flame-cut or flame-cut and planed edges.
2. Load-deflection values and stress distribution were about the same for the different types of specimens.
3. Small cracks occurred in the die side of the punched holes, but only after the connections had been visibly and permanently deformed. The first cracks appeared when the average load on the specimens was 186 per cent of the yield-point. No cracks were found in any of the drilled holes until an extreme deformation was reached, and then only one minute crack appeared.

Taking these results as a whole, the writer believes that they indicate satisfactory quality in the flame-cut connections and that they tend to refute allegations of brittleness.

Three-Level Grade Separation at Chicago

Complicated intersection of several railways eliminated—Tracks carried over and under a street bridge which was rebuilt—Project planned as a unit—Work done under heavy railway and street traffic—Special structures

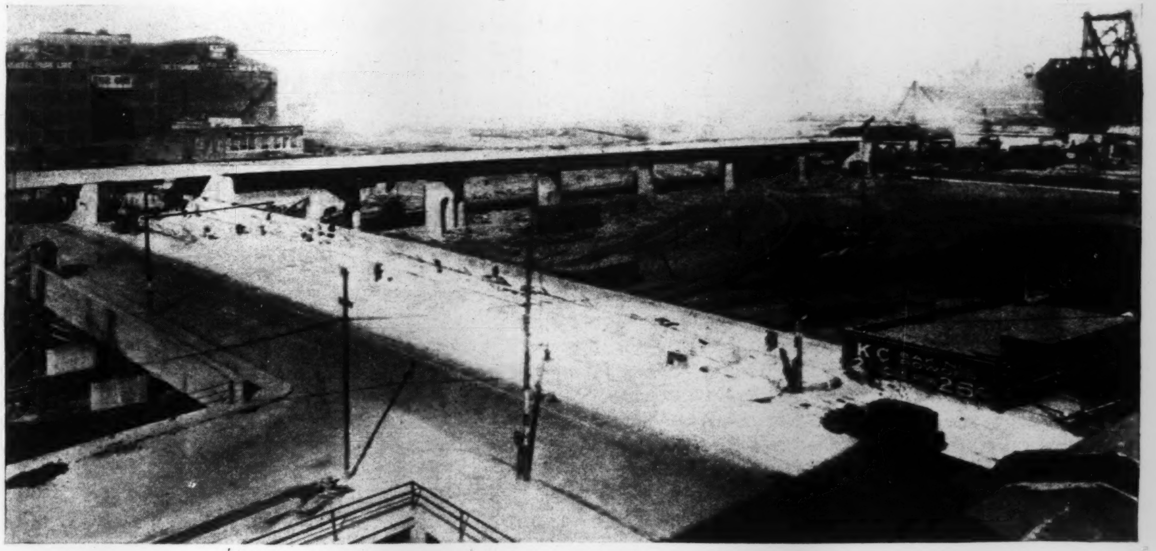


Fig. 1—Three-level grade separation at Chicago

New Canal St. bridge in center, with end of 16th St. at left. Burlington Railroad passes east under Canal St. and swings to north to connect with approach to Union Station. Two parallel double-track viaducts cross over Canal St. to two bascule bridges over Chicago River, at right. The through-girder spans cross the Union Station approach

ONE of the most complicated and costly of the many grade separations at railway crossings in Chicago is the three-level crossing in the vicinity of Canal and 16th Sts., which includes a railroad bridge carried above a street bridge, viaduct construction of unusual character and the shifting of two railroad bascule bridges to fit track rearrangements. It involves not only the separation of intersecting and connecting tracks of several railroads, with difficulties in providing adequate clearances, but also the raising of the high-level tracks sufficiently to cross a street bridge that spans the low-level tracks. Besides requiring structures of special design it involved carrying on construction work in the face of continual train and switching movements. A view of part of this work is shown in Fig. 1, with a general plan in Fig. 2.

At this point the south aproach to the Union Station, used by the Chicago, Burlington & Quincy, the Pennsylvania and the Chicago & Alton, extends north and south parallel with the east side of Canal St. and separated from it by groups of yard tracks. But at 15th Place the Burlington leaves the approach and turns west. Lines running east and west, intersecting these tracks and extending to the Chicago River, include the Baltimore & Ohio (with the Chicago Great Western, the Pere Marquette and the Soo Line as its tenants to reach the Grand Central Station), and the joint tracks of the Burlington and the Chicago & Northwestern connecting with the St. Charles Air Line at its bridge over the Chicago River. This line, which terminates just west of the river, is used for interchange connections between the railroads on the east and west sides of the river.

All these lines were at the ground level, with a track layout complicated by numerous industrial spurs and yard connections. An interlocking plant for such a network of intersecting and connecting tracks was almost impracticable, and in view of the eventual necessity of grade separation no attempt was made to design such a plant, all movements being governed by hand signals of the several switchmen. About 750 trains pass the crossing daily, nearly all of which have to reduce speed, while a large majority have to come to a stop at the crossing. An old truss bridge approached by grades of 3 per cent carried Canal St. over the east and west lines.

Under the new arrangement the north and south lines, with the Burlington junction, remain at the low or ground level, while the east and west lines are elevated to cross over the others and also over Canal St. and the yards. As a preliminary it was necessary to adopt a definite layout for the low-level tracks, so that supports for the elevated tracks could be located, but even then it was necessary to make special designs for many of these supports in order to provide the necessary clearance for cars, especially on the numerous curves of the low-level tracks. All railway structures are designed for Cooper's E-75 loading.

Steel and Concrete Viaduct—A reinforced-concrete viaduct, 1,000 ft. long, in which alternate spans have steel bracing between the bents, is the most striking of the new structures. This viaduct carries the double-

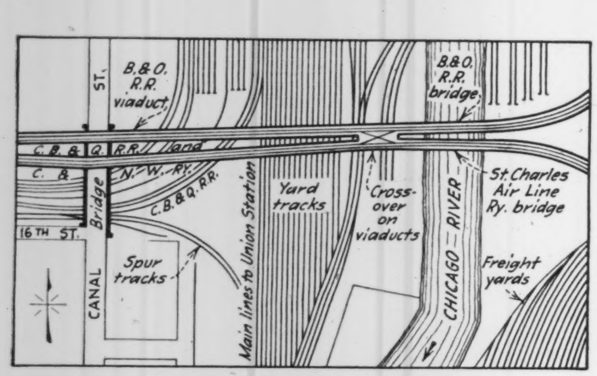

B.&O. R.R. viaduct
ST.
B.&O. R.R. bridge
C. B. & Q. R.R. and
C. & N.-W.-RY.
C.B.&Q.R.R.
Bridge
16TH ST.
CANAL
Spur tracks
Main lines to Union Station
Yard tracks
Cross-over on viaducts
CHICAGO — RIVER
St. Charles Air Line Ry. bridge
Freight yards

Fig. 2—Three-level grade separation

track joint line of the Burlington and Chicago & Northwestern, noted above, and in order to cross above the Canal St. bridge it required a grade of 1.44 per cent. Longitudinal resistance to stresses set up by trains on this grade is provided by diagonal steel bracing between the bents. As there was no room to place an abutment for the bridge over Canal St. this bridge is carried by a tall steel bent, which is connected to the adjacent bent of the concrete viaduct by a double set of steel diagonal bracing thus forming a braced tower. The steel bent is cased in concrete, but all the steel bracing is exposed. Beyond the bridge another viaduct with both steel and concrete spans on concrete piers descends on a grade of 1.83 per cent for 500 ft. and then 1.16 per cent to the Chicago River bridge of the St. Charles Air Line.

Railway Bridge over Street Bridge—For the bridge to carry the joint viaduct tracks over the Canal St. bridge, a shallow floor was designed in order to minimize the elevation of the tracks, while giving the required clear headroom of 13½ ft. above the street. This bridge, Fig. 3, has two spans of 43 ft., with an intermediate steel bent which is carried up through the roadway of the bridge below. These spans consist of eight 30-in. I-beams, four to each track, with each rail depressed between a pair of beams, in a trough formed in the concrete deck which incloses the beams. Membrane waterproofing is laid across the floor and in the troughs, while the troughs are lined with asphalt planks at the bottom and sides. In each trough is a 24-in. creosoted fir timber approximately 9 in. thick but sized to fit the vertical curve by which the grade on the viaduct runs into the descending grade east of the bridge.

A ¾-in. steel plate 24 in. wide, laid on the timber, is punched for spikes for the 90-lb. rail. As the tracks are on the horizontal curve of 3½ deg., this punching had to be laid out with great care. Along the sides of the plate are riveted Z-bars which form guard rails and have their top flanges at the level of the bridge floor.

Baltimore & Ohio Viaduct—Parallel with the steel-braced viaduct already described, and about 200 ft. north of it, is another double-track viaduct and bridge to carry the Baltimore & Ohio main line over Canal St. and the low-level tracks to a connection with its new bascule bridge crossing the Chicago River. However, owing to the steep grade by which Canal St. drops away from its bridge over the low-level tracks, this inclined viaduct approach does not reach so high an elevation as its neighbor and has a grade of only 0.6 per cent.

Concrete cylinder piers sunk to rock support thin concrete piers having arched openings to reduce the weight, and having a pair of I-beams embedded in the top form seats for the deck spans and distribute the load, as shown in Fig. 4. On account of clearance limitations, four ste bents were used in place of piers where the structur crosses the present double-track main line, so that th low-level tracks could remain in operation until the ele vated tracks were completed. After removal of the low level tracks these bents will be incased with concrete t the same outlines as the piers.

Each double-track span, 35 to 47 ft., consists of twelv closely spaced I-beams embedded in reinforced concret the spans being separated over each bent. The sout curb, which retains the ballast, also forms a 30-in. canti lever walk in which electric conduits are embedded. Th north side has only a shallow curb to retain the ballast Two steel-girder spans carry the tracks over Canal St.

Canal St. Bridge—The new bridge, carrying Canal St over the low-level tracks, and built as a part of the grade separation project, consists of seven steel spans on con crete abutments and steel bents, most of the intermediat bents being at an angle with the street line on account of the curved track layout. The spans are mainly of I-beams embedded in the reinforced-concrete deck, but some of the longer spans have shallow plate girders to

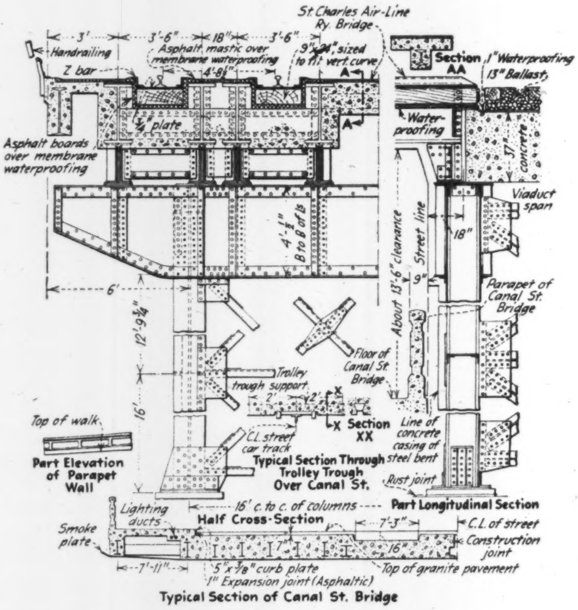
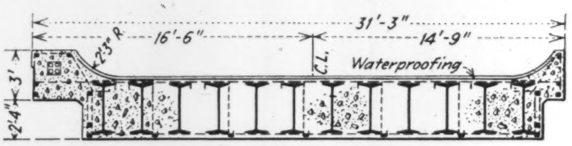
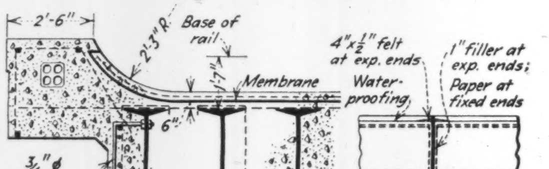

St. Charles Air-Line Ry. Bridge
3'
3'-6"
18"
3'-6"
Handrailing
Asphalt mastic over membrane waterproofing
9"x24", sized to fit vert. curve
Z bar
4'-8½"
A
¾" plate
Asphalt boards over membrane waterproofing
Section AA
1" Waterproofing
13" Ballast
Waterproofing
37" concrete
Viaduct span
4'-1½" B to B of Ls
18"
6'
12'-9¾"
About 13'-6" clearance
Street line
9"
Parapet of Canal St. Bridge
Floor of Canal St. Bridge
Trolley trough support
2'
2'
X
Section XX
16'
Top of walk
Part Elevation of Parapet Wall
C.L. street car track
Typical Section Through Trolley Trough Over Canal St.
Line of concrete casing of steel bent
Rust joint
Part Longitudinal Section
Lighting ducts
16' c. to c. of columns
Half Cross-Section
7'-3"
C.L. of street
Smoke plate
7"
16"
Construction joint
7'-11"
5"x⅜" curb plate
1" Expansion joint (Asphaltic)
Top of granite pavement
Typical Section of Canal St. Bridge

Fig. 3—Railroad bridge over Canal St. bridge


31'-3"
16'-6"
14'-9"
2'-3" R
C.L.
Waterproofing
3'
2'-4"

Section of 41 Foot Spans


2'-6"
2'-3" R
Base of rail
1'-7"
Membrane
6"
4"x½" felt at exp. ends
Water-proofing
1" filler at exp. ends; Paper at fixed ends
¾" ϕ bent bars
¼" filler for bearings
Pier
I beams

Section Through Joint

Fig. 4—West viaduct of Baltimore & Ohio Railroad

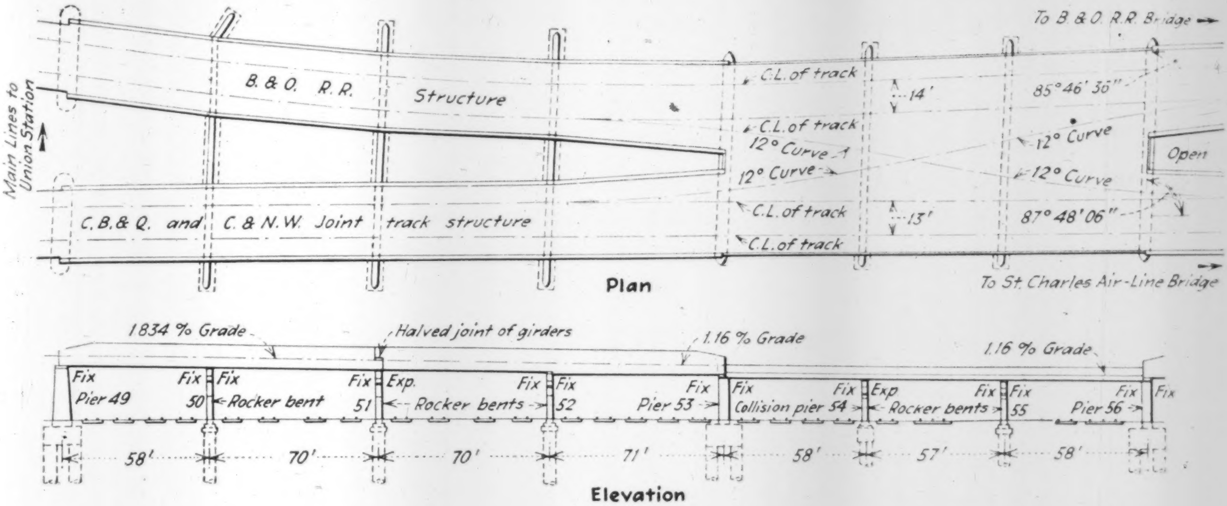

To B.&O. R.R. Bridge
Main Lines to Union Station
B.&O. R.R. Structure
C.L. of track
14'
85°46'30"
C.L. of track
12° Curve
12° Curve
12° Curve
12° Curve
Open
C.B.&Q. and C.&N.W. Joint track structure
C.L. of track
13'
87°48'06"
C.L. of track
Plan
To St. Charles Air-Line Bridge
1834 % Grade
Halved joint of girders
1.16 % Grade
1.16 % Grade
Fix
Pier 49
Fix
50
Fix
Rocker bent
Fix
51
Exp.
Rocker bents
Fix
52
Fix
Pier 53
Fix
Fix
Collision pier 54
Fix
Exp
Rocker bents
Fix
Fix
55
Pier 56
Fix
Fix
58'
70'
70'
71'
58'
57'
58'
Elevation

Fig. 5—Double viaduct over low-level tracks

give the necessary strength without increasing the depth of floor. The total width is 80 ft., including 10-ft. sidewalks (Fig. 3). This bridge was built in two longitudinal sections in order to continue traffic on the heavily traveled thoroughfare. The two halves of the concrete deck are connected by a tongue-and-groove joint.

Blast-plates of $\frac{3}{4}$-in. copper-alloy steel, 48 in. wide, are anchored into the concrete deck over the center of each track to protect the concrete from the blast of the passing engines. These plates extend about 12 in. beyond the parapets to divert the smoke away from the sidewalks. Two troughs in the deck provide for the streetcar tracks, which will have grooved girder rails on shallow steel ties embedded in a thin layer of concrete. Granite block paving will be laid on the entire width of the roadway, but the concrete sidewalks will have a cement finish.

On account of unsatisfactory experience with many concrete parapets it was proposed to use steel handrailing, but the engineers finally decided upon a solid parapet wall of concrete, to be built in place, but built in such a way as to eliminate the shrinkage that is the usual cause of cracks and failure. This was effected by concreting the railing not later than 48 hours after the deck was poured, this being the time of about maximum elongation of the deck concrete. By this means the railing concrete will be in compression. The railing has joints over each bent. This bridge has street approaches with grades of 5 and 4 per cent. Concrete-crib retaining walls with solid faces are used at the earthfills for the ends of the railway and street viaducts.

Viaduct Over Yards—From Canal St. east to the river the elevated tracks cross main lines, coach yards and a series of freight tracks and yards. Over the main-line junction of the Burlington the spans are unsymmetrical and on a skew (Fig. 1), as the piers had to be so located as to give ample clearance for long cars passing on the low-level tracks having curves of about $10\frac{1}{2}$ deg. Beyond this junction the supporting piers and bents will be nearly at right angles to the spans, but in their location and spacing they are governed by the layout of the numerous yard tracks and other facilities. Here some of the spans have through-plate girders with a deck of transverse I-beams embedded in concrete, others have deck girders with concrete floors. To provide for a double crossover connecting the tracks of the two parallel viaducts, there are three deck spans completely incased in concrete (Fig. 5). The intermediate supports for these spans are steel bents about 80 ft. long, with rocker bearings, the columns seating on 6-in. pins in the shoes.

Special Girder Connections—As shown in Fig. 5, a

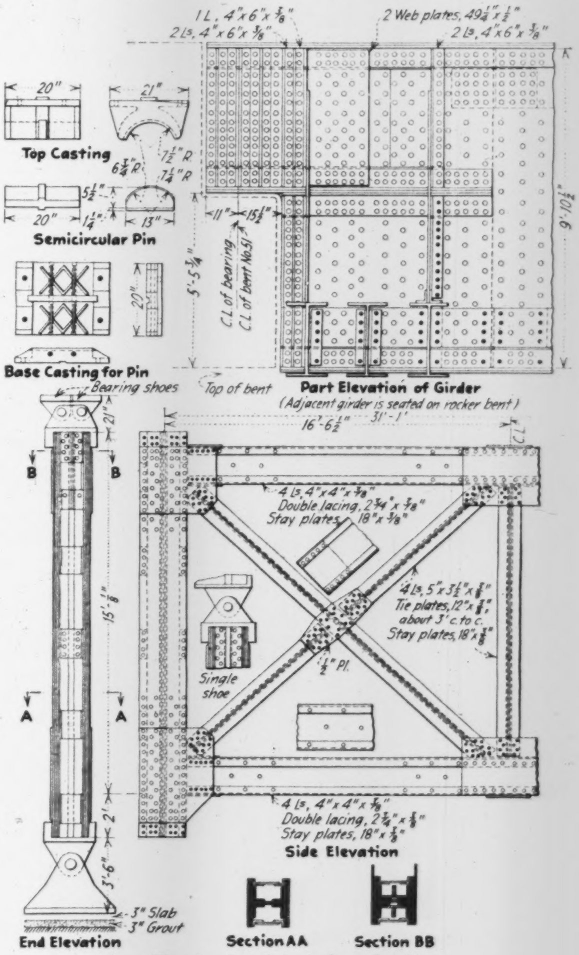

1L, 4"x6"x 5/8"
2Ls, 4"x6"x 5/8"
2 Web plates, 49 1/4" x 1/2"
2Ls, 4"x6"x 5/8"
20"
21"
Top Casting
6 3/4"R
7 1/2"R
7 1/4"R
5 1/2"
20"
1 1/4"
13"
Semicircular Pin
20"
Base Casting for Pin
Bearing shoes
Top of bent
11"
15 1/2"
5'-5 3/4"
C.L. of bearing
C.L. of bent No.51
9'-10 1/2"
Part Elevation of Girder
(Adjacent girder is seated on rocker bent)
16'-6 1/2"
31'-1'
2'1"
B
B
4 Ls, 4"x4"x 3/8"
Double lacing, 2 3/4" x 3/8"
Stay plates, 18"x 3/8"
4 Ls, 5"x3 1/2"x 5/8"
Tie plates, 12"x 5/8", about 3' c. to c.
Stay plates, 18"x 5/8"
15'-1 5/8"
Single shoe
1/2" Pl.
A
A
2'
4 Ls, 4"x4"x 3/8"
Double lacing, 2 3/4" x 3/8"
Stay plates, 18"x 3/8"
Side Elevation
3'-6"
3" Slab
3" Grout
End Elevation
Section AA
Section BB

Fig. 6—Special viaduct details
Above, halved joint of girder spans. Below, typical rocker bent.

group of four through-girder spans is carried by end piers and three steel bents, the latter being introduced to give the necessary clearance for the tracks. Expansion movements of the four spans are concentrated over the middle bent, an arrangement which necessitated special construction, since there was no room for two sliding joints. To meet this condition the ends of the adjacent girders are halved together, so that one projects over the other, these shallow ends being heavily reinforced, as shown in Fig. 6. The end of the upper girder has a half or semicircular pin which slides on a steel bearing plate upon the lower girder, this latter girder rocking upon the top of the bent. The shallow end of this lower girder, however, could not be reinforced sufficiently to carry the heavy load from the upper girder. A steel casting is bolted to it, therefore, which carries the pin bearing above and transmits its load directly to the cross-girder of the bent, thus relieving the girder web.

Each of these heavy 70-ft. girders has a web plate 118x$\frac{7}{8}$ in., with each chord composed of two sideplates 12x$\frac{9}{16}$ in., two angles 8x8x1$\frac{1}{8}$ in. and five cover plates 20x$\frac{5}{8}$ in. Rocker bent 55, which supports both viaducts, consists of five columns, 76 ft. c. to c. of end columns, and is 84 ft. long over all, including cantilever extensions.

River Bridges—As noted already, the elevated tracks connect with the two 200-ft. double-leaf bascule bridges which cross the new straightened channel of the Chicago River. Owing to the change in the river the Baltimore & Ohio has had to build a new bridge to replace the old one which was located at Taylor St. This new structure is located about a mile farther downstream and closely adjacent to the new bridge of the St. Charles Air Line (Fig. 2). As it was built in advance of the track- elevation work, provision was made for jacking it up to the new level when required. During the period of raising the river bridge and constructing that portion of the viaduct over the present Baltimore & Ohio tracks the traffic of this road was routed over the St. Charles Air Line bridge, a temporary trestle being built to connect the two viaducts.

This latter bridge, built in 1919, originally spanned the old chanel of the river with a single leaf of 260 ft., but as the river straightening was foreseen some provision was made for reversing it and shifting it so as to span the new channel, as described in *Engineering News-Record* of Dec. 25, 1919, p. 1,056. However, when bids were asked on the alternative methods of shifting and dismantling the bridge the latter was adopted as being the cheaper. The bridge was therefore taken down and re-erected on new foundations at the higher level for the elevated tracks. It was also shortened about 40 ft., as it now crosses the channel squarely instead of on the skew. During its removal and re-erection the traffic was diverted to the adjacent new low-level Baltimore & Ohio bridge.

Engineers—On account of the complication of work for the several railroads concerned, the entire project was carried out as a unit under a separate engineering organization of the Chicago, Burlington & Quincy Railroad, the plans being first approved by the chief engineers of the individual roads. For the Canal St. bridge, which was built as a part of the project, the plans had to be approved also by the city's engineers.

The engineering organization was headed by G. A. Wiegel, special engineer of the Chicago, Burlington & Quincy Railroad, with L. W. Skov of the same road as engineer of design. The entire work will cost about $5,000,000, of which $3,000,000 is for track-elevation structures and the Canal St. bridge, the remainder being for track rearrangements on the low-level lines. The entire cost is paid by the railroads.

Contractor Finances Municipal Water-Supply Development

Monthly purchase payment based on yield of wells—City has option to take over wells and pumps at any time

By ROBERT T. JACOBSEN
Randolph-Perkins Co., Chicago

HAVRE, MONT., is paying for additional water-supply wells and pumps in monthly installments. Previous to the making of the contract a bond issue for water-supply extensions had failed.

The original water-works of Havre was constructed by the city in 1905. The supply was drawn from 96 2-in. driven wells by means of two electrically driven triplex pumps. Due to lowering of the groundwater level the supply became inadequate. In 1914 the pumps and suction main were lowered 10 ft. Between 1918 and 1920 ten 8-in. wells were drilled and new pumps added. In 1927, after studies of all the feasible additional sources of supply had been made, it was decided to sink more wells. In 1928 a contractor proposed to make test borings for wells at his own risk and if these were found favorable to install wells and pumps to deliver a minimum of 1,400 gal. per minute under a 70-lb. pressure. Payment by the city was to be made monthly from the earnings from the sale of water over a period of 240 months, but the city had the option of taking over the new property at any time on certain agreed upon terms. The city accepted this proposal and on Aug. 1, 1929, three new wells were put in use. Each well is equipped with a deep-well turbine pump, automatically and electrically operated. For emergencies two of the pumps are equipped for belt drive and for the third a diesel engine is provided.

As long as the long-term purchase contract is in force the city is to manage, control and operate the plant and to pay the contractor 4.83$\frac{3}{4}$c. per 1,000 gal. pumped, up to a total of 14 m.g. per month, and 4.842c. per 1,000 gal. for all water pumped over that amount. If the power consumption should exceed 1 kw.-hr. per 1,000 gal. pumped at any time, the additional power cost may be deducted from the monthly payment at a rate of 0.87c. per kw.-hr. The city has the option to become full owner of the plant at any time at a base price of 2.375c. per gallon per day producing capacity at the time of purchase, 3 m.g. being the maximum amount to be paid for. This purchase price is to be decreased 5 per cent for each year that passes before the exercise of the option.

Assuming an annual pumpage of 200 m.g., the city would pay the contractor $9,675 yearly, or $193,500 for the full twenty years of the contract. Operation would cost the city a maximum of $3,440 for power. The labor cost would be $400. The total cost to the city would therefore be about $13,500 or 6.7c. per 1,000 gal. of water. This cost covers payment on the plant, depreciation, repairs, replacements and alterations.

The system outlined above was installed under the supervision of Emil Sandquist, city engineer of Havre, by the Fairbanks-Morse Water Supply Co. as contractor.

Testing Full-Size Transmission Towers

Wind and conductor loads applied simultaneously at as many as seven points by a pulling rig actuated by a 50,000-lb. mechanical screw

By N. B. OBBARD
Tower Dept., American Bridge Co., Pittsburgh, Pa.

IF THEORY and practice are to advance at the same rate, it is very desirable that full-size tests be made on structural units at every opportunity. Such tests are of particular importance where the type of structure is new or the stresses are in any way indeterminate. Transmission towers are a case in point and are small enough to make full-size testing practicable. The behavior of standard towers under load can be very closely predicted, but new designs and modifications of designs are constantly being developed that can only be satisfactorily investigated by means of full-size tests. Such tests are made particularly necessary by the fact that, due to the large duplication of units, the designs must be made to very fine limits, and the details must be as economical and convenient as possible.

To meet the need for a modern testing plant for transmission towers, the American Bridge Co. has recently built a new test frame at its Shiffler tower plant in Pittsburgh. This structure takes the place of an old frame built in 1912, which had become inadequate. The general arrangement and sizes of main material in the new test frame are shown in Fig. 2. The structure is built throughout of galvanized steel, all connections being bolted. The compound sections in the fixed grillage, made up of two 27-in. and two 16-in. beams, are probably the heaviest galvanized sections used up to the present time. Earth grillage anchors are used throughout together with the American Bridge Co.'s patented system of sinking the bottom diagonals so as to transfer the horizontal shear directly to the earth.

The frame can test towers up to 100 ft. in height and has space to test them either on a fixed grillage or on their own earth anchors. The type of anchorage used depends upon the conditions in the field and the requirements of the engineers, though in general the field conditions should be duplicated if possible. When towers are tested on a fixed grillage foundation, a structural shoe is built up to fit the tower stub. The legs subject to uplift are anchored down by means of $2\frac{1}{4}$-in. anchor bolts, as shown in Fig. 3. The greatest load that has so far been applied by means of the frame is a concentrated pull of 110,600 lb. at 85 ft. above grade. This gave a reaction of 247,300 lb. per leg on the fixed grillage, with a resultant maximum movement of $\frac{1}{4}$ in.

In applying test loads to towers care must be taken to avoid unnecessary complication and duplication. The loads on an ordinary single-circuit tower must be suitably divided among five points, representing three conductors and two ground wires; and on a double-circuit tower between seven points, representing six conductors and one ground wire. These loads must be applied simultaneously in a transverse direction, representing wind loads on the cables; and longitudinally, representing unbalanced pulls or broken cables. In addition, loads acting as wind loads on the structure itself must occasionally be applied at intermediate points on the tower.

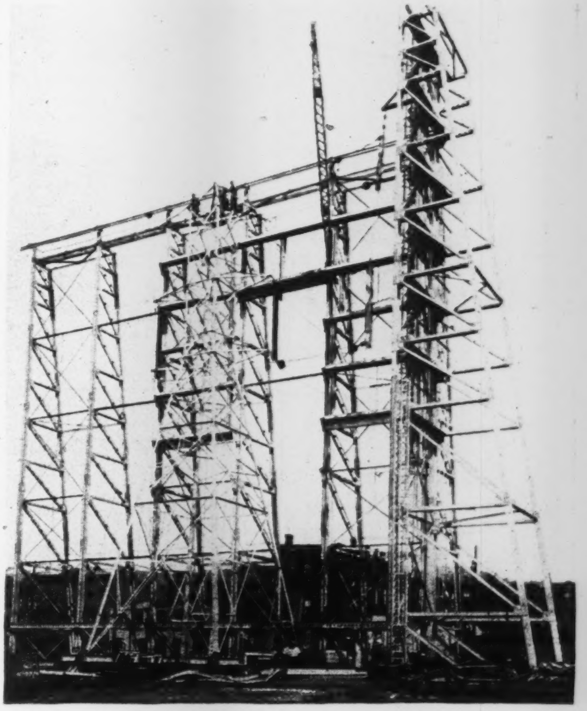


Fig. 1—Set-up of transmission-tower testing apparatus

Tower under test is in center frame.

The development of a simple and reliable pulling rig has, therefore, been a matter of importance, especially as any rig must be capable of adaptation to uncommon arrangements or numbers of loads to be applied. Fortunately, conductor loads are almost invariably equal to each other, though different from the ground-wire loads. On the other hand, the conductor pulls usually occur in groups of three, and the development of a rig to give three equal loads is rather difficult.

The standard rigs finally adopted for ordinary double-circuit strain towers are shown in Fig. 4. The transverse loads are applied through adjustable doubletrees and reduced to a single load at the dynamometer. The doubletrees are merely double-channel sections punched uniformly on 3-in. centers, so that standard strain plates may be slipped between them to give $\frac{1}{2}$-in. variations in spacing. Various lengths and weights of doubletrees are kept in stock, as it has been found that comparatively few sizes will cover the whole range of test requirements. Longitudinal loads are applied through an equalizing rig that gives three equal conductor loads. These loads are usually heavy ones, and the use of doubletrees to distribute them would require very heavy sections. Using the rig shown, the equalizing material acts only as a strut and may be made of a simple double-angle section with adjustable strain plates.

The transverse and longitudinal test loads are both

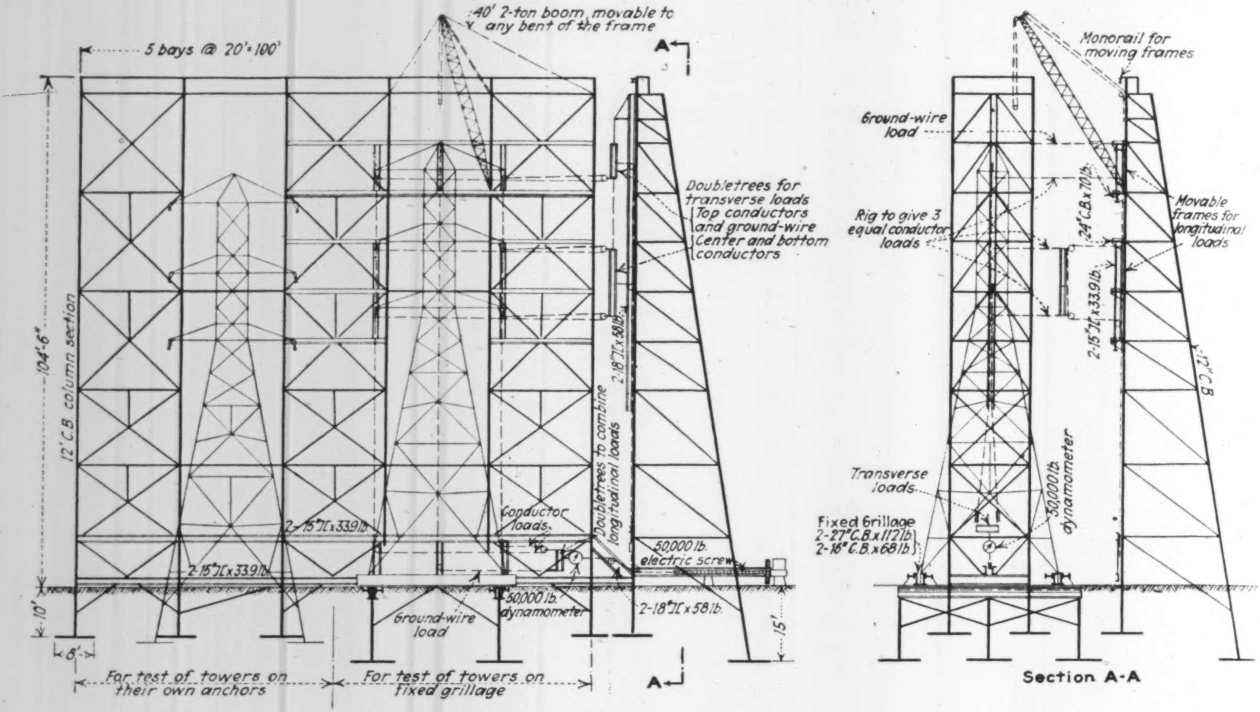

40' 2-ton boom, movable to any bent of the frame
5 bays @ 20' = 100'
104'-6"
12" C.B. column section
Doubletrees for transverse loads
Top conductors and ground-wire
Center and bottom conductors
2-18"][x 58 lb.
Doubletrees to combine longitudinal loads
Conductor loads
2-15"][x 33.9 lb.
2-15"][x 33.9 lb.
50,000 lb. electric screw
50,000 lb. dynamometer
Ground-wire load
2-18"][x 58 lb.
10'
8'
15'
For test of towers on their own anchors
For test of towers on fixed grillage
A
A
Monorail for moving frames
Ground-wire load
Rig to give 3 equal conductor loads
24" C.B. x 70 lb.
Movable frames for longitudinal loads
2-15"][x 33.9 lb.
12" C.B.
Transverse loads
50,000 lb. dynamometer
Fixed Grillage 2-27" C.B. x 112 lb. 2-16" C.B. x 68 lb.
Section A-A

Fig. 2—General arrangement of tower-testing frame

brought down to single pulls through reduction rigging, if necessary, and are read by two 50,000-lb. dynamometers. The loads are applied by means of two 50,000-lb. electrically driven mechanical screws, operated from a central control station. These screws give a smoothly applied, easily controlled load that has proved to be very satisfactory for testing purposes. Vertical test loads, which are comparatively small, are applied by means of scale pans and 60-lb. blocks of spelter.

In making tests a regular schedule is prepared, showing the loads to be applied, the order of application, the dimensions of the variable doubletrees and notes on any special features of the test. For suspension towers there will ordinarily be first a maximum transverse load, giving the operating condition of wind pressure on unbroken cables. This will be followed by a lesser transverse load combined with one or more broken cable loads. In a typical test the first loading tests the flexible hangers, the second the lower crossarm and bracing below it, the third the top crossarm and basket bracing, and the fourth the ground-wire peak and main legs. Since it is impossible to produce maximum stresses in all members at the same time, a sequence of tests is adopted that tests minor members first and the main members last of all. This is done so that should any changes or alterations be necessary they can be made without delaying the whole test unduly.

In testing a double-circuit semi-strain tower, the first loading tests the flexible hangers, the second the crossarms, bracing and ground-wire peak, and the last the main-leg members. To these loadings, it is, of course, often necessary to add other loads to meet special design conditions.

Deflections of towers under test are read by means of transits from targets on the tower, and levels are taken of the footings. The readings obtained will show in a general way the action of the tower under load, but will not be capable of very fine analysis, since a portion of the deflection is due to slip in the bolted connections. For the same reason the tower will always take a small permanent set.

As the deflection readings are not of very great interest, it is usual when testing towers to run the load up to half, three-quarters and full load, taking readings at each point. No effort is made to obtain a smooth deflection curve or to examine the set at half or three-quarter loads, as the bolt slip makes such efforts useless. It is interesting to note that the point at which the bolts cease to hold adjoining members by friction and take a small slip to come into full bearing is easily distinguishable,

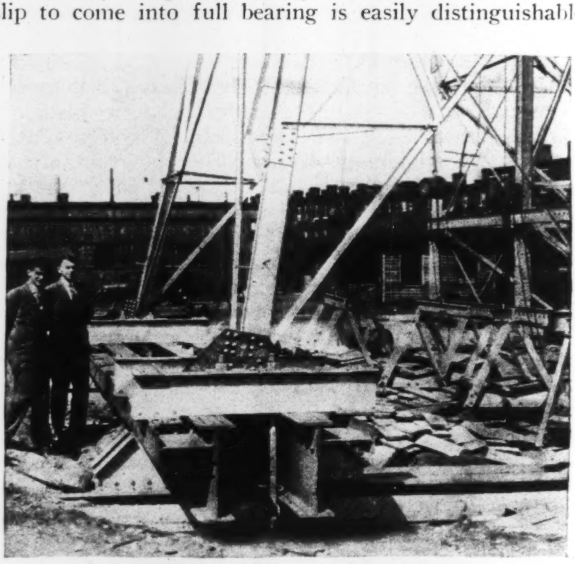


Fig. 3—Tower anchorage to fixed grillages

At right, hanging from the differential pulleys, are the pans that carry the vertical test loads.

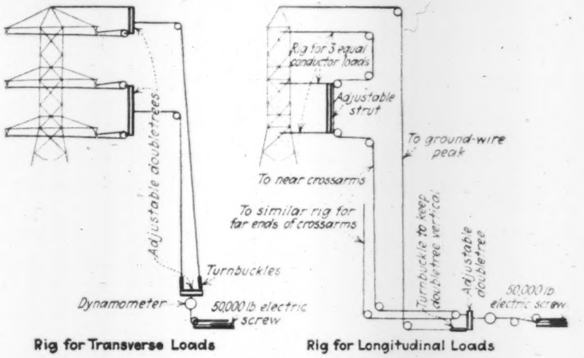


Fig. 4—Applying test loads to a transmission tower

Details show standard rigs, for testing double-circuit strain towers, to give one ground-wire load and six equal conductor loads.

and usually occurs at about half the maximum load. It can be quite plainly heard by ear, and the result may be seen upon the dynamometers and with the transits.

When a series of tests on a tower has commenced, every effort is made to carry it continuously through to completion, in order to save resetting instruments or recalibrating dynamometers. The speed and convenience with which a test can be made depends very largely upon the minor equipment and details of the testing frame. The new structure has a very complete system of walkways, together with ladder bolts on the face of every main column. Monorails are provided for changing pulling beams on the face of the frame, and brackets are built out to take the weight of the transverse doubletrees off the lines. A 2-ton 40-ft. gasoline-driven boom, which can be mounted on any of the main columns, is used for making changes in rig and erecting towers for test.

The testing plant was completed in the spring of 1930 and has proved to be very satisfactory in operation. Using a gang of five men, it is possible to erect, rig, test and dismantle small towers in four working days. Six test pulls, involving three changes of rig, have been made in three hours. This new frame should expedite the testing of towers and increase present knowledge.

Structural Welding for Profit

Address at annual convention of American Welding Society in New York outlines Dominion Bridge Co.'s welding philosophy and practice—Structural-steel welding committee reports completion of extensive test program

TO THE structural-steel fabricator welding represents merely a means of effectively joining two or more steel parts. If analysis shows it to be more economical than riveting for a particular joint or structure, welding should be used. If not, sentiment or a desire to promote a new process should not dictate its use. Briefly, this is the philosophy of the Dominion Bridge Co., as expressed by D. C. Tennant, structural engineer, who outlined to the American Welding Society convention in New York the rather extensive welding work that his company has done during the past few years. Two other papers on structural welding, a research paper on shrinkage strains in butt-welded joints and a highly promising report from the structural-steel welding committee, were also on the program, which covered almost every field of welding. E. A. Doyle, Linde Air Products Co., was re-elected president, and Frank P. McKibben was reelected senior vice-president.

Of the structural welding papers, one by Odd Albert, bridge designer, New Jersey state highway department, presented a series of charts planned to reduce the amount of computation necessary in designing eccentrically welded connections. H. H. Moss, Linde Air Products Co., New York, described an interesting series of tests made for the purpose demonstrating the claim of gas welding to be permitted under the new Detroit building code. The uniform and excellent results obtained (showing factors of safety from 3.13 to 5.35 for the different types of joints tested) by welding operators trained and qualified under a standard procedure control were particularly striking.

"If welding promises a profit, we use it," said Mr. Tennant in beginning his illustrated address on some of the welding work that his company has turned out. Welding has been extensively and successfully used in the plate and tank shop for many years, particularly on light work. In heavy penstocks welding is used instead of calking to insure watertightness. Recently the long pipe line for the suction dredge used on the St. Lawrence River canal at Beauharnois, Que., was entirely arc-welded.

The supposition that shop men trained in riveted practice are averse to the introduction of welding is erroneous, in Mr. Tennant's opinion. By using welding for selected purposes, where a distinct saving over riveting can be shown, fine cooperation from the shop personnel has been secured. Mr. Tennant cited a few random examples of structural welding work, such as railing posts for highway bridges, truss shoes and building trusses. One type of railing post was a T-section cut from an 8-in. I-beam, with a small plate welded on top as a cap, and with the flange welded to the outer end of the floor beam. The stem of the T was made deeper at the sidewalk level, where the bending moment is great, and tapered to a small dimension at the top. Cutting was accomplished without any waste. The other post was made up of a 5-in. H-section with welded clip angles for railing connection and with a welded base and cap plate, all attached in a special jig. Welding was justified and showed a saving because of the considerable number of duplicate posts. Truss shoes resembling ribbed castings, made up of thick plates machined to fit and welded, have proved economical on a number of railway and highway bridges. In bridge trusses the outward component of stress at the hip joints has been economically resisted by a welded diaphragm. Crane columns have been welded, and a particularly stiff crane girder was fabricated by using a standard I-beam with a stiffening channel welded with web horizontal along the top flange. Welding in this case avoided the use of countersunk rivets or short fillers to raise the bottom of the crane rail above the rivet heads that would have protruded above the channel web. Numerous sawtooth building trusses have been fabricated and shipped in one piece.

In all of this work it has been the aim to have important stresses or strains resisted all by welding or all by riveting, inasmuch as the distribution of stress in a partly welded and partly riveted joint is difficult and uncertain to ascertain. These various uses of welding resulted in a saving of from 1 to 25 per cent in weight. Cost saving of similar magnitude is, however, seldom obtained. Cost saving usually depends upon the effective use of jigs, the ingenuity with which the welded connection is designed and the amount of duplication of pieces provided.

One of the most interesting examples of cost saving by welding is afforded in the recently completed seventeen-story Architects Building in Montreal. Planned to use steel-cored columns with heavy steel girders and open-web bar joists, the final design utilized light welded trusses instead of the steel girders. These welded stresses were incased in concrete. The top chord was composed of two angles strong enough to take the erection loads and the dead load of the concrete. The bottom chord, composed of two heavier angles, was designed to take all tension from full dead and live load. Diagonals were made of angles or flats sufficiently strong to take the shearing stresses, and so arranged as to intersect the top chord at points of support of the open-web bar joists. The welded trusses were designed wherever possible as continuous at the columns, providing a rigid joint for wind resistance. Fabrication costs were higher for these trusses than for steel beams, but the considerable reduction in weight over steel beams resulted in a net saving.

Welding Practice—Some attempt at standardization of welded connections has been made by the Dominion Bridge Co. in order to stimulate welding thought along proper lines and to emphasize the principles to be followed, but it is the company's policy to require individual attention for each welded problem as it comes up. One set of tables has been prepared showing the size and amount of longitudinal fillet welds required to connect the ordinary standard beams up to 24 in. in depth and the corresponding Bethlehem and CB shapes and develop the full tension and bending values of the sections. The tables show only two lines of welds, so in some cases the required length of weld is exceedingly long. In this connection Mr. Tennant referred to some recent McGill University tests that showed that for a weld 7½ in. long the maximum stress per linear inch is 1.7 times the average, in welds 15 in. long 2.2 times, in welds 22½ in. long 2.6 times, and in welds 30 in. long 3 times the average stress. It is the company's practice to design beam and column connections with some flexibility and to figure the beams as simple spans. Where longitudinal and transverse fillets act together the allowable unit stress for transverse shear is taken at 500 lb. per linear inch less than for longitudinal shear, because there is a tendency for the transverse fillet to take the greater share of the load. Overhead welding is avoided. Sufficient field holes are used to enable the structure to be bolted and plumbed prior to field welding. Column splices are made by plates along the flanges, shop-welded to the lower column sections. When fillers are required these are shop-welded to the upper column section with sufficient welding to develop the bearing value required.

The effect of welding procedure on shrinkage strains in butt-welded joints was considered in a paper by C. H. Jennings, of the Westinghouse research laboratories. The smallest shrinkage strains were obtained by laying the metal in vertical layers parallel to the sides of the V's, working from the outside toward the center of the V. Small quantities of metal were deposited at a time rather than placing a continuous run by manipulating the electrode in a weaving motion. In fact, the joints made with the latter procedure developed the greatest shrinkage strains. Peening was found very effective as a means of reducing shrinkage strains in butt welds. It also proved useful in producing uniform stress distribution in the butt-welded joints.

Structural Welding Report Complete

The long-awaited report on structural welding will be presented to the committee for approval in June, according to the compilers, H. M. Priest and Milton Male. L. S. Moisseiff, chairman of the committee, thought that the period of examination should not exceed four weeks, so that the report can be revised and published in time for the fall meeting in Boston in September. As outlined, the report will include 200 pages, divided half and half between the actual report and appended tables.

Some 1,400 welded joints fabricated in 39 shops from steel made in three mills have been tested in 24 laboratories. The results are thus believed to be indicative of what may be expected from the average fabricator. There were at least five specimens of every type of joint tested, and the usual number was seven, so that a fair average for unit stress values is assured. All data collected during the investigation will be included in the report, so that full opportunity to analyze the committee's results and conclusions will be afforded.

Welding Research

The meeting of the American Bureau of Welding, the research division of the society, was made up of numerous committee reports. An experiment in the method of operation of the fundamental research committee (consisting of about fifteen professors in various colleges) is being tried in the Boston territory, where professors from Harvard and M.I.T., together with some of the research staff of Watertown Arsenal, have formed a local committee to discuss various research problems. If the scheme proves useful in Boston, it may be extended to other localities, for under the present system the fundamental research committee seldom is able to meet more than once a year and then to consider such a diversity of problems that progress is slow.

The committee on standard tests is studying a report made to it by H. L. Whittemore of the Bureau of Standards. Specimens for tension, bend and shear, both longitudinal and transverse, are included. Impact and fatigue have not been considered because of lack of data. Prof. Comfort A. Adams, chairman of the bureau of welding, pointed out the necessity for a report analyzing what the various tests mean and how they are interrelated. Such information is incomplete and contradictory at present.

C. A. McCune, chairman of the welding wire committee, urged the necessity of a general broadening of wire specifications, basing requirements on performance, thus satisfying the claims of all patented wires to be included and encompassing all classes of bare or covered electrodes or wire.

New York Aqueduct Construction— Safe or Unsafe Tunneling?

Fatalities on 20-mile Yonkers-Brooklyn tunnel work lead to press charges that contractor disregards safety precautions—Investigation by *Engineering News-Record* disproves charges—Elaborate safety system in use—Bad rock conditions encountered—Analysis of fatality record

By H. W. RICHARDSON
Assistant Editor, Engineering News-Record

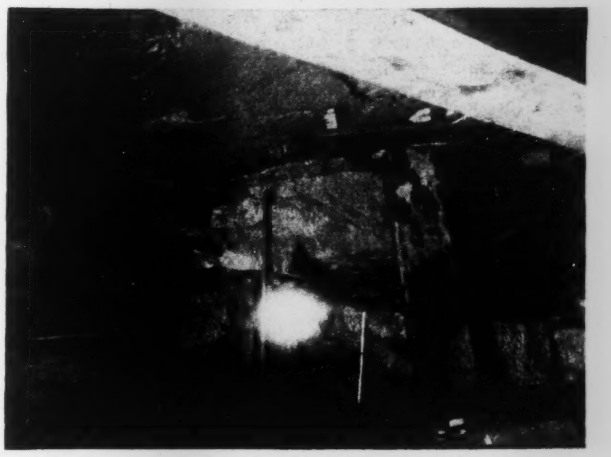
BECAUSE of a succession of fatalities charges have been made by the New York press that the New York City water tunnel No. 2, now under construction from Yonkers to Brooklyn, is unsafe and that the work is being driven at reckless speed, resulting in a heavy accident toll. Careful inspection of the tunnel and analysis of accidents and their cause by *Engineering News-Record* show that the charges are unfounded. Tunnel driving is not being pushed with undue speed or by methods that subordinate safety to progress. On the contrary, steady progress consistent with accepted tunneling practice and methods is being maintained. Everything humanly and mechanically possible is being done to prevent accidents. No money is being spared to protect the workmen.

The Accident Record—Advertised in four sections, the entire tunnel, totaling 105,280 ft., or almost exactly 20 miles, in length, was let to one contractor, Patrick McGovern, Inc., at a price close to $43,000,000. Nineteen shafts have been sunk to tunnel grade, and from sixteen of these shafts 29 headings have been driven. At present 2,600 men are employed, in three shifts, but the force reached a peak of more than 3,000 last January.

Work has been under way two years; all shafts have been sunk and lined, and up to April 20 tunnel excavation was 85 per cent completed. In that time accidents resulting in 44 fatalities have occurred on the work, 22 of which were caused by rock falls.

Bad rock conditions have been the most prolific source of serious accidents. The size and great depth of the tunnel are other contributing factors in the accident toll. The excavated diameter is 19 to 25 ft., and its depth ranges from 380 to 780 ft. below surface. The finished tunnel section is circular and lengths at various diameters are: 21 ft., 3,679 ft.; 17 ft., 95,069 ft.; 15 ft., 6,532 ft. Seamy, folded and blocky rock has been encountered at many points; faults, both major and minor, are common.

Rock Conditions—All of the 21-ft. portion of the tunnel lies in Yonkers gneiss. Just south of the north end of the 17-ft. section a short section of Fordham gneiss is found, which soon gives way to an even shorter stretch of Inwood limestone. South of the limestone and continuing through the Bronx to East River the tunnel lies in Manhattan schist. Limestone is again found under the river, and the rest of the tunnel through Queens and Brooklyn traverses Brooklyn injection gneiss. The general strike of bedrock for the entire tunnel is generally in a northeast to southwest direction, parallel with the tunnel line. The dip of the rock varies with localities but is usually more than 45 deg.



An example of shattered and faulted rock encountered at many points along the entire 20-mile length of tunnel

Some disturbed and faulted areas contain everything from shattered and blocky rock to short stretches of fine rock gouge. In the Yonkers gneiss sound rock will suddenly spall off the roof and walls in slivers, accompanied by sharp cracking noises; a popping and cracking resulting from the readjustment of the surrounding rock after shooting. The popping is caused by structural failure of the rock and not mere opening of seams.

Roof Supports—Little temporary timber support is being used. In bad roof, steel supports of three types are used; they are three-set H-beam frames or curved steel ribs carrying light channel-iron lagging, or else pressed-steel liner plates. Where necessary, all or part of the concrete lining is placed immediately, to make the tunnel safe.

Tunneling Procedure—Nine of the shafts were sunk to rock as pneumatic caissons; two shafts started in rock, and the remaining eight were sunk within open cofferdams. The tunnel is driven by top heading with a very short bench, 9 to 15 ft. long. The average firing round consists of 65 holes, 50 in the heading and 15 (horizontal) in the bench. The heading cut and the bench are fired together before the rest of the heading. A complete cycle of drilling, shooting and mucking is usually completed in two eight-hour shifts.

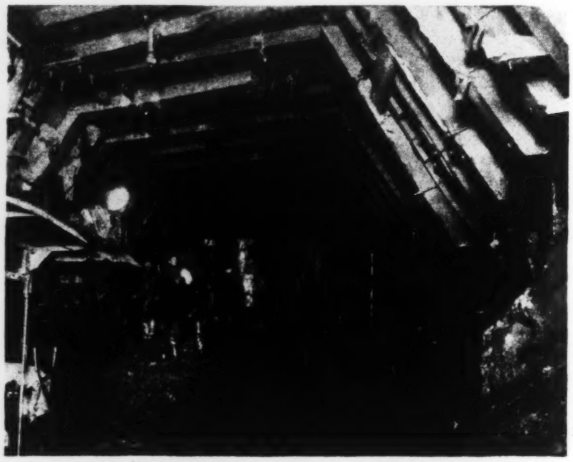
Mucking is done with air-operated shovels loading into 4-yd. cars, handled to the shafts by storage-battery dinkeys. Cleaning up the invert is done by a drag scraper just prior to concreting. The invert and side walls are poured from gravity dump cars; the arch is placed by pneumatic gun. As all concrete is furnished by truck mixers, there are no major concrete plants on the job.

Each shaft contains a counter-balanced two-cage elevator operated by electric hoist of modern electrical type, located directly over the shafts.

Safety Program

At the start of his work the contractor organized a complete safety department and established a thorough safety program, which has been followed consistently. The program is under the direct supervision of a safety superintendent, who also directs the medical and compensation work (the contractor is self-insured). This superintendent, William C. Archer, is a member of the Ohio and New York bar and has been connected with industrial accident work since 1911. His medical department consists of nine full-time doctors and one first-aid man. Four medical offices have been established on the job. Every workman is given a physical examination when first reporting for duty, and thereafter when returning from a layoff of more than one week. An effort is made to determine the worker's mental attitude toward his job and safety, as well as to check his physical qualifications.

Graphic records of the department quickly disclose any rising tide of a particular class of accidents and indicate localities and foremen having an unusually large number of mishaps. Constant pressure is brought to bear on those in charge of shifts and shafts where accidents are prevalent. When a particular class of accident seems to occur more frequently a special effort is made to find and eliminate the cause. Frequent safety meetings of all who have men working under them are utilized in accident reduction. Safety posters have not been found effective, but personal letters are frequently sent to the foremen emphasizing need for caution in particular phases of their work. In urgent cases telegrams prove to be effective reminders. The whole safety program is based upon the idea of reaching the men directly, constantly and effectively.



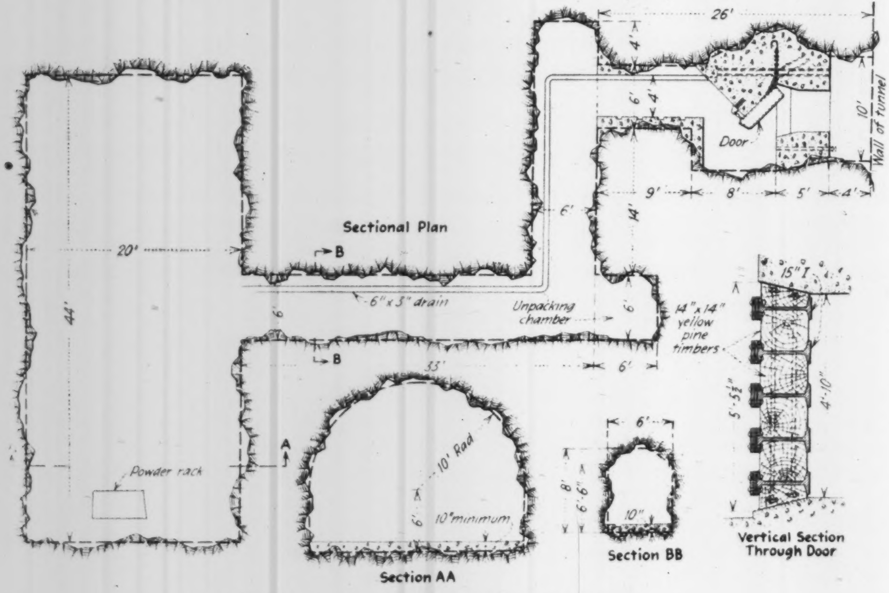
Two methods of handling a bad roof

Exceptionally poor arch has been protected by concrete placed behind timber forms shown in foreground. Steel roof supports in background have been carried to very face of heading before next drilling round was started. Men are standing on bench.

Safety Patrol—The safety department has men patrolling the tunnel at all times to check upon safety of methods, to discover and point out unsafe conditions and to keep up the safety morale of the workmen constantly. The department has full authority to order methods changed or the work stopped until practices believed unsafe can be corrected or brought to the attention of officials. In addition, every inspector and engineer of the city's force is constantly on the lookout for unsafe practices and conditions and has authority to have them remedied.

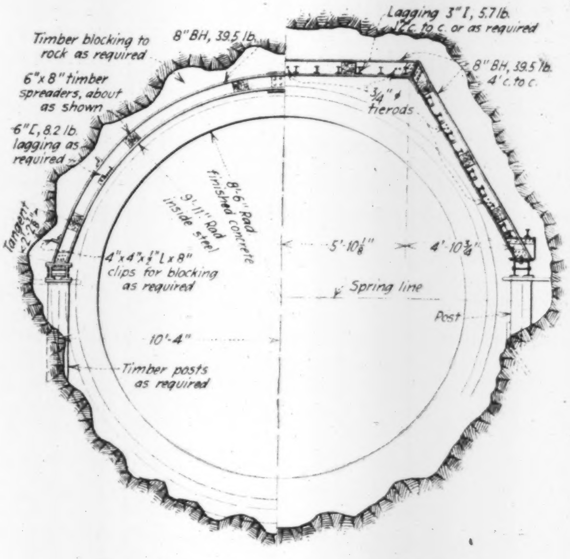
Equipment Safety—Safety work starts with the equipment on the job. Every piece of plant is kept in first-class shape and, when showing signs of wear, is discarded. In sinking a shaft, a hoisting engine was replaced by a new one. Soon afterward a drum flange on the new drum broke, dropping a bucket and killing a man. This is one of two fatal accidents charged to failure of equipment. The other was caused by a connecting pin shearing off a coupling, permitting a dinkey to crush a man against a mucking shovel. This is a remarkable record, considering the vast number of plant units scattered over the 20 miles of work.

Roof Hazard—As falling rock has been the most prolific source of fatal accidents, special attention is constantly given this problem. The roof and sides of the headings are scaled and sounded after every shot. Where roof supports are considered necessary, they are placed immediately, before the drills



Underground magazine for dynamite storage

Sixteen of these chambers have been excavated at tunnel grade. Not more than 2,000 lb. of powder is stored in any one magazine. Electric detonating caps are kept in separate smaller chambers.


Lagging 3" I, 5.7 lb. 12" c. to c. or as required
Timber blocking to rock as required
8" BH, 39.5 lb.
8" BH, 39.5 lb. 4' c. to c.
6"x8" timber spreaders, about as shown
3/4" ϕ tierods
6" [, 8.2 lb. lagging as required
8'-6" Rad. finished concrete
9'-11" Rad. inside steel
Tangent 2'-2 3/8"
5'-10 1/8"
4'-10 3/4"
4"x4"x1/2" L x 8" clips for blocking as required
Spring line
Post
10'-4"
Timber posts as required

Two styles of permanent steel roof supports

H-beam ribs, either semicircular or three-set, are usually set 4 ft. center to center. Steel lagging is placed as required. Timber or dry-rock packing is used if the roof needs structural support. Where roof does not require actual support but protection against possible rock falls is desired, the steel timbering is used without packing.

are set up. Every Sunday the entire tunnel is sounded and scaled from scaffold cars. Suspicious places are immediately supported. Four fatalities due to rock falls have occurred while the steel supports were being placed.

Care of Explosives—Elaborate underground magazines for storage of powder have been built at all shafts except two, where no driving was done, and one, at Hill View, where the shaft is isolated. A plan and sections of these magazines are shown in an accompanying illustration. They are located at tunnel grade close to the shafts. As can be seen from the illustration, the winding chambers are designed to absorb much of the shock of an explosion. A heavy I-beam and timber door will close automatically when an explosion occurs. A light outside door is kept locked the key being held by only one responsible party.

Hoist Safety—Every precaution has been taken to safeguard the operation of the shaft elevators. Before a cage can be moved, signal men at both top and bottom must close a releasing switch. The skips are automatically dogged at the top. Muck cars are dumped from a trestle above the ground level. On the trestle tracks are bumping blocks next to the shaft, which permit a car to be rolled off the skip without interference, but cars cannot be transferred from the trestle to the skip without first moving the blocks. Automatic gates are placed at the trestle level. The cages are seldom stopped at the ground level. At this point the section of track next to the shaft is folded back over the adjoining track except when actually in use, acting as a bumping block.

There are many other safety features to be found on the work. The tunnel is well lighted and kept clean.

Analysis of Fatalities

The accompanying table classifies the 44 fatalities as to cause and location. Rock falls were responsible for 22 of the total. They were not confined to any particular portion of the tunnel. Eleven fatal accidents occurred from falls in the south half of the tunnel, all in Brooklyn injection gneiss, while ten were in the Bronx section, in Manhattan schist. Eleven of the forty-four fatal accidents were due to failure of the human element, in misunderstanding of signals, failure to carry out orders or a direct violation of reasonable personal preventive measures. Five of this class occurred in handling dinkeys and cars. One example is a death caused by use of a wooden tie as a push rod between dinkey and shovel in moving the mucker up to the face. The tie slipped, striking a man with fatal results. Special bars had been provided to use as push rods, and the use of any other device was strictly prohibited.

ANALYSIS OF FATALITIES

(A) Failure of Equipment. (B) Failure of Human Element

Kind	No.	Individual Cause
Surface	1	One killed when struck by dragline bucket stripping topsoil
Shaft	6	One struck by bucket, died later from infection of broken leg.
		Plank placed across shaft to establish center line. Hoisting engineer supposed to have been so notified, but he let bucket down, breaking plank. Two men killed by its fall.
		Man jumped to scaffold 28 in. below another scaffold, could have stepped down on bracing. Lost balance, pulling another off scaffold; second man caught himself on bracing, but other fell to his death. (B)
		Flange of hoist drum broke, allowing cable to run off drum; cable slacked, dropping bucket of muck. When cable caught impact of bucket fall broke it. Fall of bucket killed man at shaft bottom. (A)
		Welder working on erection of shaft machinery let his cage down without warning, killing workman taking measurement in bottom of shaft. (B)
Rock Falls	22	Small rock fell from roof, 150 ft. back of heading, striking man squarely on top of head.
		At different times unexpected rock falls from walls and roof of heading killed fifteen; one case was that of a shovel runner, struck while in his operating position.
		One killed while scaling roof.
		Four killed while erecting roof support.
		Rock falling from side of shaft killed one.
Dynamite Explosions	8	Drilled into loaded hole. Resulting explosion knocked down scaffold, which killed one man in fall. (B)
		Explosion resulting from drilling into unfired shot killed three. The protrusion of the rock at this point was not large enough to be noticed, and the pressure of the previous shot had closed the hole.
		Blaster and helper killed by flying rock 1,240 ft. from heading. Rock, weighing about 150 lb., cut shot-firer in two, throwing part of his body against helper hard enough to knock him down, fracturing skull. Helper died later. Rock went another 200 ft. before stopping. Accident unprecedented in tunneling experience.
		Shaft boss and mucking foreman killed in unexplainable accident. Field of several tight spots in invert was loaded ready to shoot, and firer was awaiting orders. These two men entered together, gave order to fire and for some unknown reason failed to retire to safety before shot was fired.
Dinkeys and Cars	7	At different times three men were killed while switching or coupling cars. (B)
		One man, squeezed between dinkey and shovel, died long afterwards from lung abscess.
		Man was pushing dinkey onto cage at bottom of shaft. Signal man at bottom gave clear signal when dinkey was only partly on cage; his signal released the cage interlock, and the hoist runner started the cage. (B)
		Tie was being used as push rod in moving shovel with dinkey (a forbidden practice). Tie slipped, killing one man (B)
		Failure of coupling pin on dinkey when pushing shovel crushed one man (A)
Total	44	

Organization—The tunnel is being driven for the board of water supply of New York, under the direction of Thaddeus Merriman, chief engineer. C. M. Clark, department engineer, is in charge of field work, assisted by R. W. Armstrong, senior division engineer. Patrick McGovern is in direct charge for his firm, Patrick McGovern, Inc. John S. Macdonald, vice-president and chief engineer, is supervising the work in Queens and Brooklyn. C. H. Harrington is in charge in the Bronx.

Small and Compact Sewage-Works for Aurora, Colo.

Sedimentation and separate sludge digestion with mechanical equipment and effluent aerated and chlorinated

By JAY W. McCULLOUGH
Civil Engineer, Denver, Colo.

THE AURORA sewage-works is notable both as a small plant designed to meet somewhat unusual conditions at a minimum cost and as the first up-to-date plant in the state of Colorado. —EDITOR.

THE RECENTLY BUILT sewage-works of Aurora, Colo., includes a grit channel; a settling tank, equipped with a mechanically operated skimmer and sludge scraper; a separate sludge-digestion tank, provided with a sludge agitator; a sludge-drying bed; an effluent aerator; and a chlorinator.

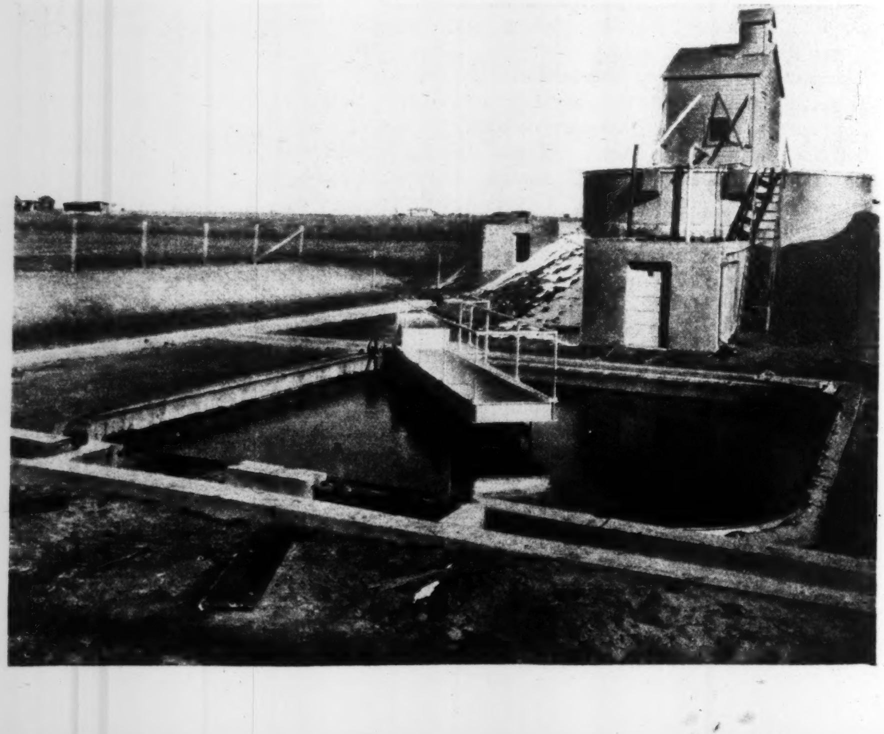
Aurora is a residential suburb of Denver, with a population of 2,800. At present, the place is wholly residential, but in zoning the city an industrial zone located in a separate drainage area was provided. The present plant is designed for treating sewage from the residence zone only, and for a future population of 5,000. When that population is exceeded it is expected that another settling tank will be provided and that the capacity of the digestion tank will be increased by heating the sludge. When industries are established, works to heat their wastes will be built adjacent to the present plant for domestic sewage and with an outlet into an open ditch that receives the effluent from the present works. This ditch, which is about a mile long and discharges into Sand Creek (a tributary of the Platte River), has a very small natural flow during the three winter months, while at its maximum the flow is too small to dilute the sewage effluent. The ditch passes through farm land, a dairy and the Denver municipal airport. For these reasons it is necessary that the effluent be stable enough not to create a nuisance in its flow between the plant and Sand Creek. Chlorine is added to assist in getting an effluent of the required stability.

Sewage enters the works through a grit channel 15 ft. long and passes to a settling tank 28 ft. square with a 7-ft. side depth and a bottom sloping 1 ft. to the center. For the present flow there is a detention period of between three and four hours; for future use the tank will handle 500,000 gal. a day with a detention period of two hours. The sludge gathered by the scraper is pumped from the center of the settling tank into a sludge-digestion tank 26 ft. in diameter and $17\frac{1}{2}$ ft. deep, with a capacity of 3 cu.ft. per capita. The digested sludge flows to a drying bed. The effluent from the settling tank flows to the chlorinator through an open concrete aerating channel, 3 ft. wide and 65 ft. long, with a roughened bottom. As the thin layer of water ripples over the roughened bottom it is aerated, thus reducing the demand for chlorine.

The concrete of the channels and tanks was designed to give a watertight job. No so-called waterproofing compounds were added, dependence being placed on carefully graded aggregates; ordinary cement, clean water carefully regulated in quantity, the whole thoroughly mixed for at least two minutes, then carefully placed and properly cured. The concrete in the thin walls all tested over 3,000 lb. per sq.in. at 7 days and about 5,000 lb. at 28 days. Seven sacks of cement were used to a cubic yard of concrete. The digester-tank walls are 12 in. thick, and there have been no leaks or seepage.

The total cost of the plant was $26,000, divided roughly as follows: equipment, $9,600; chlorinator, scales and cylinder of chlorine, $850; construction, $15,550.

The plant was designed by the writer, with the co-operation of Dana E. Kepner, formerly state sanitary engineer.



General view of sewage-works at Aurora, Colo.

Grit channel and settling tank in foreground. In rear, separate sludge-digestion tank. The sludge-drying beds are located back of the digestion tank out of sight.

NEWS OF THE WEEK

State Development of St. Lawrence River for Power Is Approved

DEVELOPMENT of hydro-electric power in the international section of the St. Lawrence River by the State of New York is authorized in a bill passed by the New York state legislature and approved by the governor on April 28. The bill declares that part of the St. Lawrence River within the boundaries of the state to be a natural resource of the state for the use and development of commerce and navigation and for the creation and development of hydro-electric power.

To carry out this policy the act sets up "The Power Authority of the State of New York," a "body corporate and politic, a political subdivision of the state, exercising governmental and public powers, perpetual in duration, capable of suing and being sued . . . and having such other powers as may hereafter be conferred upon it by law."

Constitution of Power Authority

The power authority is to consist of five trustees appointed by the governor by and with the advice of the senate, the first trustees serving one, two, three, four and five years respectively and their successors serving five years. These trustees are authorized to take over such of the staff of the St. Lawrence Power Development Commission as they deem necessary and are empowered to employ such other engineering, marketing and legal assistance as they require.

The power authority is instructed to proceed with the development of the international section of the St. Lawrence River, for power and navigation, cooperating with the proper Canadian authorities, along the lines laid down by the power development commission in its report (*Engineering News-Record*, Jan. 8, 1931, p. 85).

The power authority is authorized to negotiate with the appropriate Canadian authorities on matters affecting its work and to apply to appropriate agencies in this country or Canada for such licenses, permits or approval of its plans as may be necessary or advisable, but may not waive or surrender any of the state's sovereign or proprietary rights. It is authorized also to develop, maintain and operate power plants in that part of the river owned or controlled by the state and to negotiate contracts for the sale, transmission and distribution of the power generated. These contracts must provide for all operating and maintenance costs, interest and amortization and reserve charges sufficient to retire

(*Continued on page 745*)

Steel Frame Collapses in High Wind During Erection

During a 40-mile wind the partly erected steel frame for the new Roosevelt High School auditorium, Washington, D. C., collapsed after working hours, April 22. The frame was held by the usual erection bolts and had been guyed. According to reports, the guying was inadequate, and the accident could have been prevented if the frame had been more completely guyed. Estimates of damages indicate a loss of several thousand dollars and only a few days' time.

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Governor Vetoes Twin Cities Sewage-Disposal Bill

Governor Olson, of Minnesota has vetoed the metropolitan sewage-disposal bill, which passed both houses of the legislature by a large majority.

The bill provided for sewage-disposal of St. Paul, Minneapolis, South St. Paul and contiguous territory. It provided for a commission, three from Minneapolis, three from St. Paul and one appointed by the governor from outside of the cities. It also provided that the cost of construction be allocated on the basis of assessed valuation of the three communities.

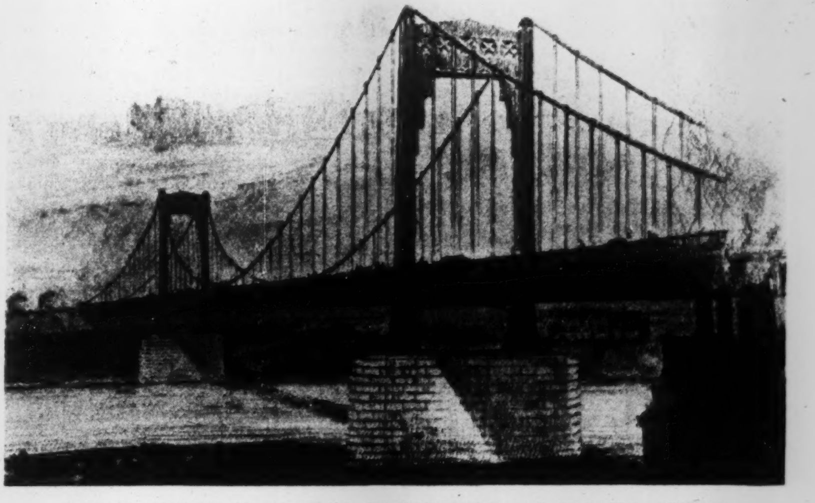
The governor returned the bill, stating that he objected to it on the grounds that it was unfair to the taxpayers of Minneapolis and villages situated in Hennepin County (Minneapolis) and that it was in favor of the private packing industries of South St. Paul.

Federal Commission Revises Its Views on Railroad Valuation

A FINDING of value of a railroad property of importance far in excess of the importance of the railroad concerned was made by the Interstate Commerce Commission on April 21. The report of the commission dealt with the excess income of the Richmond, Fredericksburg & Potomac R.R. as determined under the recapture provisions of the transportation act of 1920. The commission's action is of importance because this is its first valuation decision since its valuation of the St. Louis & O'Fallon Ry. was disapproved by the supreme court because the commission did not consider reproduction costs.

The O'Fallon Decision

The court, in the O'Fallon decision, said (*Engineering News-Record*, May 30, 1929, p. 869): "The question on which the commission divided is this: When seeking to ascertain the value of railroad property for recapture purposes, must it give consideration to current, or reproduction costs? The weight to be accorded thereto is not the matter before us. No doubt there are some, perhaps many, railroads, the ultimate value of which should be placed far below the sum necessary for reproduction. But Congress has directed that values shall be fixed upon a consideration of present costs along with all other



SOUTH TENTH ST. BRIDGE, PITTSBURGH, AS IT WILL APPEAR

Foundation work is under way on this parallel-wire cable structure over the Monongahela River. The main span will be 725 ft., with side spans of 275 ft. Cables will be 8 in. in diameter. Towers will be of the fixed-base flexible type, with notable architectural treatment. The north approach from downtown Pittsburgh will be through the old Armstrong tunnels, shown above at the far end of the bridge.

pertinent facts; and this mandate must be obeyed."

Referring back to this decision, after reviewing the contention of the railroad company that dominant weight should be given to reproduction costs to the complete exclusion of original costs, the commission states: "We conclude that both cost of reproduction and original cost must receive consideration in the determination of final value for rate-making purposes. In no case to which our attention has been directed has the Supreme Court of the United States ruled as to the specific weight to be given to these elements. On the contrary, its decisions clearly indicate that they may well vary according to the conditions affecting different railroads.

Artificial Rule Condemned

"To base values in all cases upon an equal consideration of cost of reproduction and original cost or on any other fixed proportion would be an artificial rule such as was condemned in the Minnesota rate cases. 'The basis of calculation is the fair value of the property used for the convenience of the public. . . . The ascertainment of that value is not controlled by artificial rules. It is not a matter of formulas, but there must be a reasonable judgment, having its basis in a proper consideration of all relevant facts.'

"In our findings of the value of the property used by the respondent in the service of transportation during the recapture years, we are according such weight to the present cost and original cost of construction as in our judgment is justified by the record. The values found reflect in substantial degree both elements of cost."

The commission determined the cost of reproduction new of the property, except land, in use by the railroad company on Dec. 31, 1920, based on period prices reflecting cost of railroad construction in prior and subsequent years, to be $35,177,439. The cost of reproduction less depreciation was placed at $27,000,000. The original cost of the property, except land, at the beginning of the 1920 recapture period was placed at $21,698,736, and the average cost of the property in use throughout the period was $21,726,892. The value of land used was $3,322,227. The investment of the railroad at the end of 1920 was placed at $21,856,961.

Continuing, the commission said: "From consideration of the foregoing and all other facts of record pertaining to the value of the respondent's property as an economically developed, well-maintained and seasoned railroad, in operation as a going concern, we find the value thereof for rate-making purposes during the period March 1, 1920, to Dec. 31, 1920, to be $29,600,000, including $1,513,252 for working capital." Upon similar considerations, values for the years 1921, 1922 and 1923 were similarly set out by the commission as being $29,700,000, $29,400,000 and $30,100,000. The railroad company claimed the value of its property in 1920 to be $58,000,000 and $60,000,000 in 1923.

Safety Measures Recommended by Chicago Tunnel Fire Jury

RECOMMENDATIONS designed to insure the safety of tunnel workers and to prevent the recurrence of fires such as the one that recently cost the lives of eleven men in the 22d St. sewer tunnel of the Sanitary District of Chicago were presented by the coroner's jury inquiring into that disaster. The fire was reported and the construction features of the tunnel were described in *Engineering News-Record*, April 16, 1931, p. 663, and April 23, 1931, p. 701. The jury reported that the fatalities were caused by asphyxiation by carbon monoxide resulting from fire of undetermined origin. The fire was confined to the timbers still in place between the clay tunnel roof and the concrete lining.

Construction work on the tunnel is being held up until the following recommendations can be carried out:

1. All shafts, slopes and tunnels shall be lined with fireproof materials.
2. Fireproof materials shall be used exclusively in any tunnel plant structure within 100 ft. of any tunnel construction shaft.
3. The shaft and hoisting equipment shall be provided with all recognized safety devices, including steel ladders in separate compartments.
4. A telephone system shall be installed in an approved manner in every tunnel.
5. A ventilation system shall be installed to ventilate properly all sections of the tunnel.
6. The illumination of the tunnel, shaft and all tunnel plant buildings shall be only by electric lights properly installed.
7. No open flame of any description nor smoking shall be permitted in any tunnel or shaft or tunnel plant building.
8. Fire extinguishers of type approved by the Chicago Board of Underwriters shall be suitably placed in all buildings at the top of the shaft and in the tunnel.
9. No gasoline, inflammable oils or any other highly combustible material shall be stored in the tunnel, shaft or within 100 ft. of the shaft.
10. Gas masks or equivalent devices of a type approved by the Chicago Board of Underwriters shall be suitably placed at the top of each shaft and in the tunnel. Instruction in the use of the masks shall be given to all employees in charge of work and warning given not to enter the tunnel, in case of fire or evidence of gas, without the use of a gas mask.
11. A plan of tunnel, showing all special features and easily legible, shall be mounted in a glass-covered frame near the top of each shaft.
12. In all tunnels driven in soft ground under the compressed air method, there shall be an emergency exit or safety shaft located in each drift at a point not farther than 50 ft. from the air lock and on the high-pressure side of the lock. This shaft shall be provided with an air lock and so arranged that passage through the shaft may be obtained from either the surface or the tunnel.
13. In tunnels being driven under atmospheric pressure there should be emergency exits at suitable locations.
14. In tunnels driven under the compressed air method, where timber or other combustible material is used for supporting soft ground during lining, precautions shall be taken to prevent the spread of fire by filling all voids between the timbers and between the timbers and the lining by grouting with non-combustible material or by the building of non-combustible fire-stop walls at suitable locations.
15. In soft ground tunnels, driven under the compressed air method, the use of any combustible material for preventing leakage of the compressed air shall be prohibited.
16. In soft ground tunnels, driven under streets containing sewers, water lines and other utilities, care shall be taken to detect any settlement of or damage to such utilities.
17. Rules embodying all standard safety features shall be established for the use and storage of any explosives required during the construction of tunnels and shafts.
18. Equipment of the most modern and approved type shall be provided for the detection of carbon monoxide or other gas in the tunnel.
19. As there is now no division of the state mine rescue station in Cook County, it is recommended that sufficient members of the fire department be furnished with the necessary instruction in mine rescue work.
20. The equipment of the fire department of the city of Chicago should include portable telephone equipment.
21. This jury suggests that the above recommendations be embodied in the rules and regulations of the Chicago Board of Fire Underwriters.

The jury consisted of three engineers, James Versluis, John S. Dean, and John A. Garcia; a chemist, Dr. Frederick O. Tonney; and two Chicago merchants, Elmer Stevens and John T. Pirie. Edward J. Kelly, chief engineer of the sanitary district, acted as general adviser to the jury.

A.S.T.M. to Have Exhibit of Testing Apparatus

For the first time in its history the American Society for Testing Materials will sponsor an exhibit of testing apparatus and machines in conjunction with the annual meeting of the society in Chicago June 22-26. The exhibit has been planned with a view to having a distinctly scientific and broadly educational atmosphere which will be consistent with the technical nature of the society's activities.

San Diego Amends Engineering Contract With F. W. Seifert

The city council of San Diego, Calif., has amended its contract with F. W. Seifert to furnish plans for an improved sewerage system. The amended contract states that the intention is to regard Seifert merely as a contractor for engineering work who will have plans and specifications prepared by a registered civil engineer in accordance with the California law. Legality of the contract as now amended has not yet been considered by the state board of registration.

The case has aroused extensive discussion among engineers since San Diego called for bids for this service. (*Engineering News-Record*, Dec. 11, 1930, p. 942). A contract was awarded to Seifert (*Engineering News-Record*, Jan. 15, 1931, p. 123), the only bidder, to furnish a sewage-disposal plan for $18,000. Because Seifert was not a registered civil engineer, the state board requested the opinion of the attorney general on the legality of the action. The opinion stated, in part:

> I am of the view that because of this undertaking of Mr. Seifert to so make this study concerning the preparation of a complete report in the matter of a new sewerage system for San Diego, and to furnish the same to the city of San Diego, he is practicing the profession of civil engineering as contemplated by said act, and therefore is required to be licensed and certificated as provided for in said act.

Upon receipt of this opinion the board placed the matter before the district attorney of San Diego County and a warrant for the arrest of Seifert was to have been issued April 7 on the charge of violating the civil engineers' registration act. On April 6, the city council amended the contract.

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St. Lawrence River Power

(*Continued from page 743*)

the power authority's bonds within 50 years. Purchasers of power under contract must make full and complete disclosure to the power authority of all factors of cost in transmission and distribution of power so that costs to the consumer may be based on "true cost data." They are not permitted to include in such costs franchise values, going concern values or good will. Periodic revisions of rates are provided for.

Construction is not to proceed until contracts for the sale of the power have been made. In the event that the power authority is unable to make contracts for the sale of power to existing utilities it is to report that fact to the legislature together with recommendations as to how the power may be disposed of. No action on such recommendation shall be taken until the legislature and governor have given their approval.

The trustees are to receive no salary but are to be paid $100 per day and expenses when serving, provided the total shall not exceed $10,000 per year. The sum of $300,000 is appropriated for the expenses of the power authority.

ST. LOUIS MART BUILDING

This twenty-story structure, now under construction, is to provide manufacturers and distributors with facilities for display, sales, storage and distribution, having railroad tracks for 25 cars at one side and a platform accommodating 50 motor trucks. The building, about 366x330 ft., with 25 acres of floor space, will contain a garage, clubrooms, a restaurant, an auditorium seating 500 and rooms for conventions or other meetings. Its facilities will include nine truck elevators of 9-ton capacity. It is owned by the St. Louis Mart, Inc.; president, E. L. Stancliff; architect, Preston J. Bradshaw; structural engineer and supervisor of construction, W. J. Knight & Co.; general contractor, Gamble Construction Co. Estimated cost, $5,000,000.

Bids Asked for Golden Gate Bridge in Ten Contracts

Bids have been called for the $35,000,000 suspension bridge across the Golden Gate at San Francisco by the Golden Gate Bridge and Highway District. The structure will have a 4,200-ft. main span and a center clearance of about 220 ft. Bids will be received on ten separate contracts and opened on June 17. Plans for the superstructure are now available and the others will be ready on May 13.

The design includes flexible steel towers, fixed saddles (on rollers during erection) and gravity anchorages. The two cables will be slightly larger than those used on the Hudson River bridge.

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Minnesota Buys 90c. Cement

As a result of the cement-price war, the state highway department of Minnesota is making cement contracts for its 1931 paving program on a basis of 90c. a barrel net, in bulk, at the mill plus freight. The department will replace, at the new figure, contracts entered into last December for 999,982 bbl. of cement for 247 miles of paving and will also buy at this price cement for the additional paving program made possible by the legislative bond issue authorization and special federal aid.

Concrete and Gravel Associations Unite Headquarters

Executive activities of the National Ready Mixed Concrete Association, it is announced, will hereafter be carried on by the personnel of the National Sand and Gravel Association. The two organizations will maintain separate identities and their activities will be handled independently, but as they have the same operating personnel the work will be centered in the same office. Stanton Walker is director of engineering, and V. P. Ahearn is executive secretary. Offices are in the Munsey Building, Washington.

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Engineers Still Restricted by New York Dwelling Law

A bill to amend the New York State multiple dwelling law to place engineers on a par with architects in the filing of plans for multiple dwellings in all cities where the law is effective was vetoed by Governor Roosevelt after having been passed by both houses of the legislature.

The multiple dwelling law provides that plans for such dwellings are to be filed with the tenement house commissioner by the owner in person or by a registered architect acting as his agent. The amendment would have inserted the words "or by a professional engineer experienced in the planning, designing, construction or alteration of such dwellings, buildings or structures" after the word architect. A similar bill, except for the qualifying phrase, was presented to the New York legislature last year and was strongly opposed by the architectural profession because it would have permitted all engineers, whether or not experienced in building design, to file plans for multiple dwellings. Hence when the bill was submitted again this year the qualifying phrase was added. It still did not meet with approval of the architects. They desired some more definite limitation such as structural engineer. Engineers, on the other hand, oppose so restrictive a classification because it would prevent the filing of mechanical and electrical plans by engineers of those two branches of the profession.

The governor, in approving the bill, said:

"This seems to be a hastily drawn piece of legislation. It provides that licensed engineers, in order to file plans, must be experienced in planning, designing, construction or alteration of buildings, and it is possible that the amendment brings registered architects within the same requirement.

"Who is to interpret the word 'experienced'? Is it the tenement house commissioner, or is it the department of education? The existing provisions of the education law make no adequate distinction between different classes of engineers. In view of the defects of the bill, it is necessary to disapprove it."

Constitutionality of California Toll Bridge Authority Upheld

The State Supreme Court of California recently handed down in a test case a decision upholding the constitutionality of the California Toll Bridge Authority, a state agency, authorized by the legislature on June 10, 1929, to construct the proposed San Francisco-Oakland bridge. This will be the first time the State of California has financed a public project by the issuance of revenue bonds. The legislature now in session in California has taken action which permits the board of public works to include the proposed San Francisco-Oakland Bay bridge in the state highway system and approved a loan of more than $500,000 to the bridge commission to carry on preliminary work and plans.

Now the $75,000,000 bonds can be issued for the construction of the proposed bridge and the state treasury can advance the money for the needed preliminary work.

Under the direction of the state highway engineer, a surveying crew has been ordered to Yerba Buena Island to determine the land route across the island and the necessary changes to be made in the government building. The survey, which will be completed in about two weeks, must be approved by the secretaries of war, navy and commerce.

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New York Section of A.W.W.A. Meets at Troy

A record-breaking attendance of over 250 marked the spring meeting of the New York section, American Water Works Association, held April 22-23 at Troy, N. Y. This meeting marked the retirement of William A. McCaffrey, water-works superintendent at Oswego, N. Y., as president of the section. He is succeeded by Reeves J. Newsom, vice-president of the Community Water Service Co., New York City. J. Walter Ackerman, city manager of Fall River, Mass., was elected vice-president, and E. D. Case, vice-president of the Pitometer Co., New York City, was reelected secretary-treasurer.

Of the papers presented before the meeting several were descriptive of water-works installations in Troy and vicinity. James M. Caird, sanitary engineer, and William F. Luby, chief engineer of the Troy bureau of water supply, described the growth of that city's water system and the methods used to insure adequate pressure at elevations of from 30 to 500 ft. Studies for an addition to the well-water supply for Schenectady, N. Y., which experienced a water shortage during the drought, were outlined by John H. Burwell, Jr., engineer for the Schenectady water department. An interesting story of how proper exploration of underground conditions led to the development of an ample artesian flow for the Latham water district, located in Albany county within the triangle formed by Albany, Troy and Schenectady, was told by Frank J. Keis, of Solomon & Keis, consulting engineers, Troy.

More general in application were the papers prepared by Robert C. Wheeler, consulting engineer, Albany, who made a plea for foresight in planning and building water-works extensions in order to eliminate the losses due to inadequacy; by Russell Suter, executive engineer for the State Water Power and Control Commission, who presented an exposition of the aims and procedure of that body; and by G. K. Palsgrove, professor of hydraulic engineering at Rensselaer Polytechnic Institute, who described a method of analyzing graphically the flow of water through a typical dual supply system. The last-named paper will be printed in a subsequent issue.

The guest of honor at the meeting was C. Harold Foster, son of J. T. Foster, the first president of the parent association, who gave an entertaining narration of the many difficulties experienced by his father in the early days of water-works service.

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Two Georgia Counties Vote to Consolidate

Consolidation of Fulton and Campbell counties, Georgia, was approved on April 22 by the voters of Fulton county, 2,767 to 1,853, making a total vote of 4,620 out of a registration of some 28,000. Campbell county approved the merger on Feb. 17, by a vote of 893 to 245. By the 1930 census the population of Fulton county was 318,587 and of Campbell county, 9,903. The corresponding areas were 193 and 311 square miles. The larger part of the population of Atlanta is included in the merger, that city having 245,623 residents in Fulton county and 24,743 in DeKalb county. Besides Atlanta, the only incorporated places in Fulton county are College Park, 6,321 population (not counting 283 in Clayton county); East Point, 9,512; Hapeville, 4,224. Campbell county has three incorporated places, each with less than 1,500 population: Fairburn, Palmetto, and Union City. The state legislation authorizing consolidation was introduced by a representative of Campbell county and it is reported that a majority of the officials of that county favored the merger. It is expected that additional county consolidation bills will be introduced in the Georgia legislature in June. Georgia will still have 160 counties, or more than any other state except Texas, when the consolidation just voted takes effect on Jan. 1, 1932.

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Engineers to Study Pittsburgh's Public Works Department

At the request of the Pittsburgh city council five engineers have been named by the Engineers Society of Western Pennsylvania to study the methods of the Pittsburgh public works department. They are Edwin K. Morse, Samuel A. Taylor, C. S. Davis, J. N. Chester and A. G. Butler. The department has been charged with waste and inefficiency.

Engineer License Qualifications Raised in New York State

Educational qualifications for professional engineers and land surveyors in New York State have been raised. Under the new requirements an applicant for a license as a professional engineer must be a citizen at least 25 years of age, must have satisfactorily completed a four-year high school course or the equivalent thereof, must have had eight years or more of practical experience in professional engineering work of a grade and character satisfactory to the board of licensing, and must have successfully passed the examination prescribed by the board. A land surveyor must be a citizen at least 21 years of age; must have satisfactorily completed a four-year high school course or the equivalent thereof, must have had six years or more of practical experience in land surveying work of a grade and character satisfactory to the board, and have successfully passed the prescribed examination. The act goes into effect immediately and gives full legal sanction to the examinations which the license board has for some time been requiring of applicants under an interpretation of the existing general provisions of the law.

A bill to amend the education law to rewrite the definition of engineering failed to pass the legislature.

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Lumber Manufacturers' Assn. Stresses Trade Expansion

Promotion of the use of lumber for industrial and construction purposes was stressed by the trade extension committee of the National Lumber Manufacturers' Association at the association's annual meeting in Chicago on April 23. In studying the potential lumber market of the country the committee allocated one billion board-feet annually to the highway construction industry, consisting of highway bridges and trestles, road signs and markers, guard rails and posts, and erosion dams. It was recognized that strong competition would be encountered with steel and concrete now used for those purposes, but that the inherent virtues of lumber would facilitate its increased use if those virtues were promoted properly with highway authorities and highway engineers. Two examples of the successful employment of such promotional activities were cited in which highway bridges, originally specified to be built of steel, had been built of wood as a result of the efforts of the representatives of the association.

The association's trade practices committee presented recommendations to be considered by the manufacturers, wholesalers and retailers. The code provides that all lumber for industrial and construction purposes, excepting that used by the federal government or by the railroads, is to be considered the legitimate business of the retailer. Government and railway lumber is to be considered open business.

Testimonial Dinner Given to John R. Freeman

John R. Freeman, of Providence, R. I., was honored at a testimonial dinner under the auspices of the Providence Engineering Society in his home city on April 21.

Frank E. Winsor, vice-president of the American Society of Civil Engineers, outlined Mr. Freeman's contributions to engineering and industry, and Blake R. Van Leer, assistant secretary of the American Engineering Council, explained a system of traveling fellowships founded by Mr. Freeman. Other speakers who testified to Mr. Freeman's achievements were: Charles T. Main, past-president of the American Society of Mechanical Engineers; the Rev. John J. Lynch, of Fordham University, representing the Seismological Society of America; Benjamin G. Buttolph, of the Associated Factory Mutual Fire Insurance Companies; Prof. Charles F. Scott, of Yale University; Chester T. Morey, president of the Providence Engineering Society; Water Humphreys, secretary of the corporation of the Massachusetts Institute of Technology; Harry E. Sawtell, president of the Boston Society of Civil Engineers; and Henry D. Sharpe.

Mr. Freeman passed lightly over his own works in his reply. He declared the next generation will probably be called upon to solve not the riddle of material forces of nature but the problem of humanity.

Among the messages received was one one from President Hoover, which read:

"I deeply regret that public business prevents my attending the dinner being given to John R. Freeman. I would be glad if you would convey to Mr. Freeman's friends the high appreciation which I and every engineer hold not only for Mr. Freeman's great technical accomplishments but for his many public services."

COSTS AND CONTRACTS

E. N.-R. Index Numbers

Cost			Volume		
Apr. 1,	**1931**	**191.63**	**March,**	**1931**	**278**
Mar. 1,	1931	194.51	February,	1931	198
Apr. 1,	1930	207.12	March,	1930	408
Average,	1930	202.85	Average,	1930	260
Average,	1929	207.02	Average,	1929	317
1913		100.00	1913		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of April 30, with some comparisons, total as follows:

(In Thousands of Dollars)

	Apr. 30, 1931	Average of Last Four Weeks 1931	Average of Last Four Weeks 1930
Buildings:			
Industrial	$2,099	$6,539	$4,718
Other	19,392	19,295	40,122
Streets and roads.	21,158	15,619	13,338
Other eng. constr..	13,357	18,222	18,168
Total	$56,006	$59,676	$76,347

Total, all classes, Jan. 1 to April 30:
1931 .... $982,775
1930 1,131,546

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Difficulties Met in Applying Davis-Bacon Law—Movement to Finance Home Building

IN SEEKING to comply with the provisions of the Davis-Bacon prevailing-wage law, contractors for public buildings encounter difficulties. One of the first applications of this law, which requires that they must pay prevailing wage rates, was made by District of Columbia officials in connection with building work in the city of Washington. In instructions to bidders the district officials inserted the requirement that the contractors must submit a certified copy of their time books every month showing the work covered by the measurement sheets, this requirement extending to work of subcontractors or other work included in the payment, either incorporated in the building or on which the 60 per cent allowance for material is paid. To comply with the requirements, a contractor would be forced to submit certified copies of the payrolls of cement mills, steel plants and other manufacturing industries. The contractor would also be forced by these rigid requirements to determine whether or not the supply industries are paying prevailing wage rates to their employees. After protest, an order was issued modifying the requirements to relieve the contractor of responsibility concerning wages paid by supply trades. In the opinion of department officials the incident demonstrates the confusion in government circles as to the method of administering the law.

To Encourage Home Building

A national privately owned organization to help finance home building is being suggested in Washington. A decided shortage exists in the more reasonably priced homes. It is contended that home owning, even in houses of better grades, is being discouraged by high financing costs. This is certain to continue as long as speculators are being relied upon to furnish the bulk of housing. Such a national company, if certain outstanding men can be interested in the project, could be functioning by autumn and could stimulate building to an extent entirely impossible under the present disorganized system, it is believed.

Modification Sought on Boston Post Office Ruling

Upon the ruling by the comptroller general that the contract with the N. P. Severin Co., of Chicago, for the construction of the new Boston post office was improperly awarded (see *Engineering News-Record*, April 23, p. 701), the treasury department has supplied additional information to the general accounting office, apparently to obtain a modification of the ruling. The comptroller general had held that the department should have readvertised the work instead of permitting the contractors to make supplemental bids.

Railroad Side Line Denied

Reiterating that it does not favor construction and operation by independent organizations of industrially controlled short lines to act as feeders of trunk lines, the Interstate Commerce Commission has denied the application of the Trinity Valley & Northern Railway to construct a line from Cleveland to Havens, 12 miles, in Liberty County, Texas, to serve the mill of the South Texas Hardwood Co., with which the carrier is affiliated through common ownership of capital stock.

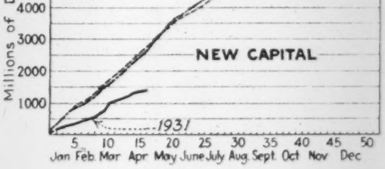
San Pedro Cutoff Authorized

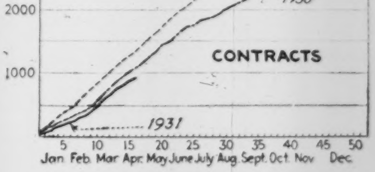
The Los Angeles & Salt Lake Railroad (Union Pacific system) has been authorized by the Interstate Commerce Commission to construct a cutoff on its San Pedro branch, which extends from the business district of Los Angeles to tidewater at Los Angeles harbor, for the purpose of eliminating 2.22 miles of track on Ocean Boulevard and other heavy-traffic streets in Long Beach. New construction will total 7.57 miles and cost about $1,944,000. Construction will commence next fall and will be completed in the summer of 1932. The railroad will receive $460,000 from the city for property conveyed.

Capital and Contracts

The week ended April 18 recorded the smallest volume of new capital issues to that date; but the next week broke even that record. Figures for the two weeks were 22 and 19 millions respectively, compared with the 1930 April weekly average of 185 millions. The accumulated total is 1,400 millions, compared with 2,680 millions in 1930.

Last week's contracts totaled 55 millions, compared with 87 in the same week of 1930. The accumulated totals are 927 millions this year and 1,132 last year.





Further Diversion of Niagara Water Recommended

Permission to withdraw temporarily 10,000 sec.-ft. of additional water through the existing passages on each side of Niagara Falls is recommended by the special international board in its final report on its two-year inquiry. The experiment, the board says, would determine whether permanent withdrawals should be authorized. The board investigated the means by which the scenic beauty of the falls might best be maintained coincident with determining what additional quantity of water might be diverted for power purposes and to this end recommends the construction of submerged deflecting weirs placed above the falls, diagonally and irregularly across the current.

The convention based upon the board's recommendations was ratified by the Canadian parliament last year, but failed to receive approval of the United States senate.

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Building Officials Conference Meets in Toronto

The seventeenth annual meeting of Building Officials Conference of America was held in Toronto, Ont., April 21-24. The sessions were attended by 80 or more officials and representatives of various building material industries.

Chief among the topics discussed was welding as applied to building construction. The prevalent feeling of the speakers, including Lee H. Miller, chief engineer, American Institute of Steel Construction; Pierre Champion, vice-president, Champion Rivet Co., Cleveland, Ohio; Frank P. McKibben, consulting engineer, General Electric Co.; H. H. Moss, Linde Air Products, New York City, and Philip A. Mason, building supervisor, Hartford, Conn., chairman of the committee on welding of the conference, was that while welding would undoubtedly be used to a greater extent in the future, its use should be controlled and regulated by statute to restrict the design to competent designers and the execution to experienced workers selected after rigid tests of their ability.

Another outstanding subject of discussion, consisting mainly of statements of the practices that prevail in various localities, was the responsibility of an owner or contractor, when excavating for a new building, to his neighbors, whether their lands had been improved or not. Similar statements were the outcome of the inquiry regarding the proper disposition of dilapidated and unsafe buildings.

Papers were also presented dealing with reinforced brickwork, construction safeguards, fire zones, recent tests of building materials, steel joists, elevators, building permits, wooden shingles, zoning administration, city planning and street encroachments, life safety in buildings, the service rendered by Underwriters' Laboratories to building authorities and the place of the building official in the social structure.

Officers elected are: William D. Guion, building commissioner, Cleveland, Ohio, president; Philip A. Mason, building supervisor, Hartford, Conn., first vice-president; William F. Hurd, commissioner of buildings, Indianapolis, Ind., second vice-president; John W. Oehmann, inspector of buildings, Washington, D. C., secretary-treasurer.

◆

Personal Notes

Wyat Thomas, for the past four years acting city engineer of Charlotte, N. C., has been appointed city engineer by City Manager R. W. Rigsby.

John L. Weber, Inc., civil engineers, of Trenton, N. J., has changed its name to Bechtel, Bryant & Weber, Inc. The members of the corporation are John L. Weber, Richard B. Bechtel and Edward K. Bryant.

Henry Earle Riggs, honorary professor of civil engineering at the University of Michigan has opened an office in Ann Arbor and will give particular attention to problems growing out of railroad and public utility regulation.

T. S. O'Connell has been appointed state engineer of Arizona to succeed W. W. Lane, recently resigned. Mr. O'Connell has been with the Arizona highway department for eighteen years and was district engineer prior to the new appointment. **W. R. Hutchins**, office engineer, will replace Mr. O'Connell as district engineer.

Paul Leach Holland, Charlotte, N. C., has been appointed chief engineer of the Maryland Public Service Commission. Mr. Holland secured the appointment by winning first place in a competitive examination in which more than 100 engineers from all over the country participated. He has been connected with the engineering firm of Mees & Mees, Charlotte, and is a graduate of the U. S. Naval Academy.

Gordon R. Young, Major, Corps of Engineers, has been authorized by the secretary of war to make an extended study of the Oder, Elbe, Weser, Rhine and possibly other river systems in Europe with a view particularly to investigating the technique and effect of regulatory works. Major Young is a delegate to the Permanent International Association of Navigation Congresses to beheld in Brussels, Belgium, on May 18.

SOCIETY CALENDAR

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; summer meeting, Tacoma, Wash., July 8-10.

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia; 34th annual meeting, Chicago, June 22-26.

AMERICAN WATER WORKS ASSOCIATION, New York; annual convention, Pittsburgh, Pa., May 25-29.

SAN FRANCISCO SECTION, American Society of Civil Engineers, held its regular bimonthly meeting on April 21. On the technical program following the business session were papers by A. A. Brown on "Subsidence and Foundation Problems in San Francisco," by Hyde Forbes on "Subsidence as a Geological Phenomenon," and by L. H. Nishkian on "Design of Foundations Subject to Subsidence." As there are 101 junior members of the section, it was decided to form a Junior Forum, to meet bimonthly, alternating with the meeting of the section.

Frank W. Salfingere, who for the past three years has been chief engineer at Randolph Field, Texas, will soon after the first of May take up new duties as chief engineer on the construction of the U. S. Army flying field at San Rafael, Calif.

◆

Obituary

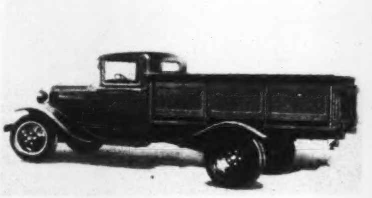
Edgar Boyd Kay, former dean of the college of engineering of the University of Alabama and former chief of the hydraulic and sanitary branch office of the quartermaster general, war department, died in Washington, April 21, aged 71 years. Mr. Kay received his degree in civil engineering from Rensselaer Polytechnic Institute and after his graduation was an instructor in Rensselaer, Union College and Cornell University. He went to the University of Alabama as professor of engineering in 1903. He served as consulting engineer for the Alabama Railway Commission from 1903 to 1915 and during that time was engaged as chief engineer for the state convict bureau and for several steam and hydro-electric power companies and cities, designing and building many water-works, sewer and lighting systems, steam and electric railways. He was the designer of municipal incinerator plants for Niagara Falls, Wellsville, Tonawanda, Valley Stream, N. Y., and other cities in near-by states, and was the inventor of the government-type incinerator known as the U. S. standard.

George E. Whitehouse, pioneer northern Ohio road builder and general contractor, died suddenly recently of heart disease at his home in Cleveland while recovering from an illness of influenza. He was 75 years old. Mr. Whitehouse became engaged in construction work shortly after going to Cleveland with his father, James Whitehouse, in 1865. His father's first job in Ohio was the construction of the Ashtabula & Youngstown Railroad. As George became older he was taken into the firm of James Whitehouse & Son, which later changed its name to J. T. & G. E. Whitehouse and still later to G. E. Whitehouse & Son.

Alfred E. Phillips, professor of civil engineering at the Armour Institute of Technology, Chicago, died on April 19. Prof. Phillips was born in New York in 1863, and was graduated from Union College, Schenectady, N. Y. He was at different times in the engineering departments of Purdue University and the University of Wisconsin, and was also engaged in private practice, going to the Armour Institute in 1899.

Construction Equipment and Materials

New Truck Bodies Available



Heavy-duty express truck

Several new truck body types especially adapted to the needs of contractors and builders have just been introduced by the Ford Motor Co., Detroit, Mich. They include regular and heavy-duty hydraulic dump bodies, standard and heavy-duty express, and stage and platform trucks, all mounted on the model AA 1½-ton chassis and available with dual rear wheels. The hydraulic dump bodies are 84x60 in., with 14½-in. sides. They are made of 10-gage blue annealed steel. The end gate is double-acting and is controlled by a manual control lever near the cab. When the clutch is released or if the motor accidentally stalls, the hoist locks instantaneously in any position regardless of load.

The heavy-duty express is designed for a large number of hauling purposes where the load does not require full protection from the weather. This body is of steel over wood, the sides being 18 in. high with wide flareboards. Extra wide fenders are provided for dual rear wheels.

◆

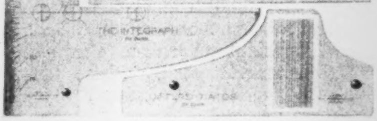
Adjustment of Tractor-Drawn Equipment by Power

Regulation of blades, scarifiers and other parts of drawn equipment from the driver's seat of the tractor is facilitated by a power control device introduced by the Caterpillar Tractor Co., Peoria, Ill. An attachment on the power take-off is connected, through universal joints, with two control rods extending parallel to the drawbar. Handles placed convenient to the driver's seat make it possible to shift either one or both of the two controls independently while the outfit is in motion.

◆

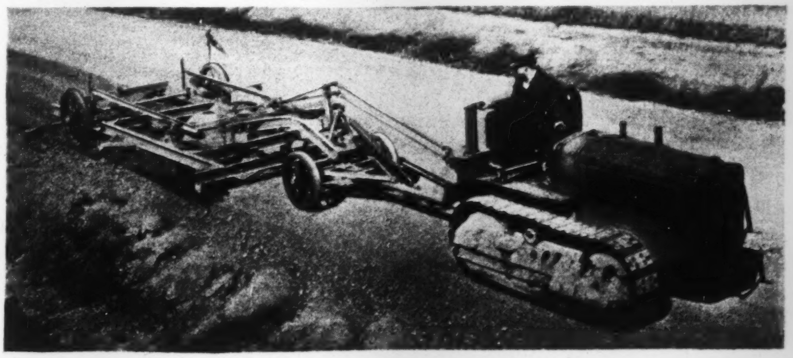
Mechanizing the Calculus

Equipment which makes possible the mechanical solution of problems dealing with the calculus in a manner analogous to the use of the slide rule in multiplication and division, and of the planimeter in the determination of areas has been developed by John M. Barr, president of the Integraph Company, 405 Caxton Building, Cleveland, Ohio. The apparatus, which can be used in the solution of problems relating to structural stresses, volume calculations and many other mathematical problems involving integration and differentiation, consists of three instruments, the Integraph, the Differentiator, and "Simpson's Rule," and an explanatory book, "The Mechanics of the Calculus." The latter consists of 358 pages, divided into three sections covering, respectively, "The Mechanics of the Calculus," "A Little About Mathematics" and "Preliminary to the Calculus of Mechanics." Directions for the manipulation of the mechanical equipment are included in the first part, the second is devoted to giving significance, by mechanical means, to the results of algebraic integration and differentiation, while the third cites a number of problems in the calculus and explains their solution.



Devices for mechanical solution of the calculus

This equipment was developed by Mr. Barr in the belief that present methods of teaching the calculus do not give students sufficient understanding of its possibilities to permit practical use in problems relating to steelwork, concrete, masonry, excavation and other engineering operations. He believes that use of this equipment sets out a problem visually so that it can be grasped and handled more readily than through a theoretical approach. Proper interpretation of results can be obtained more quickly without the necessity for abstruse calculation.



Power control applied to road planer

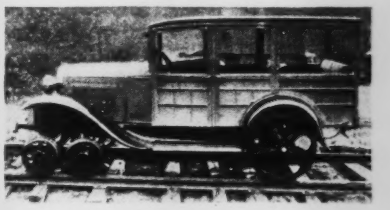
◆

Self-Propelled Rail Cars Based on Automotive Units

To provide efficient, economical rail transportation for passengers, freight, express, mail and supplies the Brookville Locomotive Co., Brookville, Pa., is offering, in addition to its regular line of locomotives, a special line of rail trucks powered with the new Ford motor. This equipment is built in a variety of sizes and types and can be classified in two main divisions:

1. Cars for comparatively light loads and standard-gage tracks, using either the standard Ford model A passenger chassis or the model AA truck chassis, with any standard or special body—roadster, touring, coupe, sedan, commercial, etc. Brookville drive wheels are bolted to the Ford rear axle hubs. For negotiating rough or crooked track and sharp curves, the front end of the machine is mounted upon a pivoted pony truck. The Ford unit is not machined or altered in any way, making inexpensive repairs available from any authorized Ford dealer. Models utilizing the Ford AA truck chassis can also be fitted with the Brookville reverse, duplicating all forward speeds. The speed range can be varied within limits up to a maximum of 40 miles per hour.

2. For comparatively heavy loads with either standard or narrow gages the Ford AA power plant is used in a heavy Brookville type D chassis, with special ship channel frame. The Ford mechanism merely carries the drive, the heavy frame and lower axles absorbing the load. Models can be furnished with any length frame from 10 to 22 ft.,



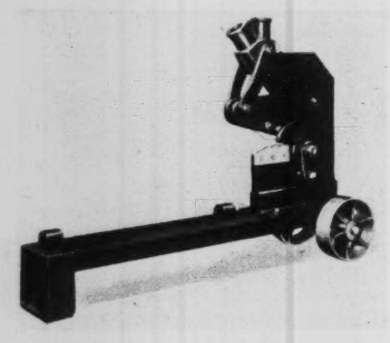
Station wagon adapted to railway use

without body or with a custom-built body of any desired type. These units employ Brookville drive wheels at the rear and Brookville pony trucks at the front. When equipped with reverse transmissions four speeds are available in either direction. The final drive ratio can be varied so as to provide speeds of from 16 to 40 m.p.h.

◆

Shears for Cutting Steel

Portability is the outstanding advantage of the model 104 armor-plate shears for cutting flats and rounds which has been announced by the Buffalo Forge Co., Buffalo, N. Y. As is shown by the illustration, this is mounted on a wheel truck, and uses a pipe handle for either transportation or cutting. The leverage is partly compounded. A stripper on the side prevents binding. Models are also available for permanent mounting on floor or bench.

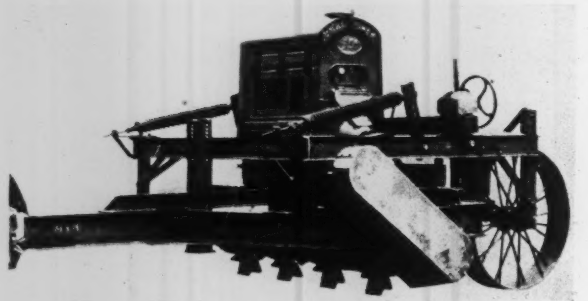

Portable hand-operated shears

◆

Mixing Machine for Oiled Roads

Thorough mixing of earth and oil for road or airport surfacing is the function of a road-mix machine developed by Clyde W. Wood, of Stockton, Calif., which is now being manufactured by the Spears-Wells Machinery Co., Inc., Oakland, Calif. This machine does in one operation the mixing which formerly required a series of graders to windrow the material back and forth. It is particularly adapted to use where the soil is a loam or sand which has a tendency to become lumpy.

The road-mix machine is simple in design and is of all-steel construction. It consists of a wheel-mounted frame carrying a 4-in. square chrome-vanadium shaft mounted on S.K.F. ball bearings. Mounted on the shaft are twenty sets of four cast-steel, manganese-tipped paddles spaced at $22\frac{1}{2}$ deg. intervals, so that five paddles are always in contact with the oiled material. A width of 8 ft. is covered in one operation. As the machine is drawn forward by a tractor, power supplied by a 60-hp. four-cylinder Hercules motor revolves the paddle shaft so that each paddle tip bites or chews a fraction of an inch and kneads the road material and oil into a uniform mixture, breaking up completely any balls or lumps which may be present. The paddles are adjustable for depths up to 6 in. An adjustable strike-off plate at the rear assists in leveling the roadway. Drive from motor to shaft is through a fully inclosed reduction gear, a chrome-vanadium jackshaft running in Timken bearings and a heavy-duty steel roller chain.


Machine for mixed-in-place road surfacing

◆

Heavy-Duty Crawler Wheels

New 15-ton crawler wheels now in production by the Trackson Co., Milwaukee, Wis., embody a number of improvements as a result of experience gained in the operation of this type of equipment during the past two years. Heavier tension members of the single strand type now replace the double strands formerly used. These tension members are easily renewed independently of the track shoes, as are also the hinge-pin bushings. Full-floating pin construction provides greater wearing area than that afforded by the old fixed-type pins. Solid bushings are now employed instead of the split type. These are drawn to special Trackson requirements with deformations in the outer walls to key them into the shoe lugs, thus preventing turning of the bushings and resultant wear on the shoes. Improved Timken bearings with cork dust seals are used, and the frames are heavier. Track shoes are furnished in two widths.

Dump-wagon mounted on crawler wheels

Business Notes

Philip T. King, 50 Church St., New York City, has purchased from the Industrial Brownhoist Corp. its entire present stock of crawler cranes and shovels, with the understanding that no additional machines of this type will be built for at least three months during the consolidation of the Cleveland, Ohio, and Bay City, Mich., plants of the corporation at Bay City.

S. R. Dresser Mfg. Co. and **Merco Nordstrom Valve Co.** are planning to consolidate, according to plans disclosed in a letter addressed to stockholders of the Dresser company requesting their approval. Assent to the merger plan has already been given by directors of the company, and also by directors and stockholders of the Merco Nordstrom company. Formation of a new company with assets of nearly $6,000,000, to be known as the Dresser Nordstrom Co., is contemplated.

International-Stacey Corp., Columbus, Ohio, has been formed by the combination of the International Derrick & Equipment Co. and the Stacey Engineering Co. Carmi A. Thompson, president of Stacey Engineering Co., will be chairman of the new organization, and Harry M. Runkle, president of International Derrick, will be president and general manager.

Isolantite, Inc., is the new name adopted by the organization formerly known as Isolantite Company of America, Inc., Belleville, N. J. The change in name is made in the interest of simplification, and will affect neither the management nor the policies of the company.

Atlantic Creosoting Co., Norfolk, Va., has leased the plant of the Savannah Creosoting Co., Savannah, Ga., and will operate it under the Atlantic name. R. H. Sheffield continues as manager.

Lincoln Electric Co., Cleveland, Ohio, has advanced George G. Landis to the post of chief engineer.

Timken Steel & Tube Co., Canton, Ohio, has appointed Walter H. Wiewel sales manager, replacing A. J. Sanford, resigned. Mr. Wiewel has been associated with the company for several years as manager of steel sales in New York City. He will make his headquarters at Canton, Ohio.

Northern Engineering Works, Detroit, Mich., has opened an office in the Fidelity Building, Cleveland, Ohio, to serve present and prospective users of cranes, hoists and other equipment manufactured by the company.

Owen Bucket Co., Cleveland, Ohio, has opened a new eastern district office at 51 East 42d St., New York City, in charge of B. A. Deline, manager. This action does not affect the activities of the present sales and service office in Long Island City, which will continue to serve the New York district.

Bay City Shovels, Inc., Bay City, Mich., has moved its Eastern sales offices from New York City to 9 Westfield Ave., West, Roselle Park, N. J., where the company already has an Eastern warehouse.

Baldwin Locomotive Works, Philadelphia, Pa., has formed the Whitcomb Locomotive Co. to take over the property of the George D. Whitcomb Co. at Rochelle, Ill., which was recently sold at foreclosure. Officers of the new company are: chairman, Samuel M. Vauclain; President, George H. Houston; vice-president, John P. Sykes; vice-president and general manager, Harold H. Perry.

Hercules Powder Co., Wilmington, Del., has appointed Theodore Marvin advertising manager to succeed the late Nelson S. Greensfelder. Mr. Marvin, a graduate of the Colorado School of Mines, has been serving as advertising manager and editor of *The Explosives Engineer*.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has centered all its lighting activities in one division under the management of L. A. S. Wood. The section will be divided into two principal groups with highway, tunnel, bridge and park lighting in one section; and commercial and industrial lighting in the other. Westinghouse also announces the advancement of J. Morris Ireland, for five years manager of the Cleveland office, to the position of special representative. He will be succeeded by F. G. Hickling, formerly at Pittsburgh.

Porter Pollock, president of William B. Pollock & Co., Youngstown, Ohio, died April 20 of pneumonia at the age of 67.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Waterworks			
New York	Pumping plant, etc.	$1,125,000	Proposed
Sewers			
Middletown (Conn.)	Sewage disposal plant	1,000,000	Proposed
New York	Settling and aeration tanks, etc.	3,867,780	Contract
Bridges			
San Francisco	Bridge	35,000,000	Bids asked
Beaumont (Tex.)	Viaduct	3,500,000	Proposed
Unclassified			
Albany	Grain elevator	1,850,000	Proposed
Turner Valley (Alberta)	Waste gas development	10,000,000	Proposed
Federal Government			
Washington	Dept. Agriculture building	2,000,000	Contract
Scott Field (Ill.)	Air Field	3,117,000	Proposed
Louisville	Post office	2,985,000	Bids asked
Brownsville (Tex.)	Dredging	5,500,000	Proposed
Factories and Mills			
New Castle (Del.)	Steel plant	1,000,000	Proposed
Garages			
Washington	Garage, theatre, etc.	5,000,000	Proposed
Power Plants			
Springfield (Mass.)	Sub station	1,000,000	Bids asked
Buildings			
Boylston (Mass.)	Hospital	1,000,000	Bids asked
Wingdale (N.Y.)	Hospital	3,104,785	Contract
New York	Office	20,000,000	Proposed
Walkill (N.Y.)	Prison	1,500,000	Bids asked
Mooseheart (Ill.)	Vocational school, etc.	1,500,000	Proposed
Cambridge (Mass.)	High school	1,500,000	Proposed
New York	High school addition	1,000,000	Proposed
Boston	Theatre	2,500,000	Contract

WATERWORKS

PROPOSED WORK

Calif., Ben Lomond—Ben Lomond Redwood Park Corp., reconstructing diversion works at Dean Creek, installing additional storage facilities of not less than 20,000 gal.

Calif., Signal Hill—City Council soon takes bids 2.5 mi. 20 in. riveted steel pipe line. Noted Apr. 23.

Ga., Thomasville—City, c/o D. R. Pringle, supt., water softening plant, incl. concrete tanks, mixing chambers, etc. $50,000. Wiedeman & Singleton, Candler Bldg., Atlanta, engrs.

Ind., Bloomington—City Council pumping stations at Griffey and Bean Blossom Creeks. $15,000. Pearce, Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs.

Ind., Peru—City Council new waterworks. $150,000.

Ky., Paris—City purchased waterworks from Paris Water Co. and plans enlargements, extensions, improvements. $150,000. G. Baldwin, city mgr.

Mass., Chester—Town, Bd. Water Comrs., dam, reservoir. $15,000.

Mass., Revere—Additional mains. $50,000.

Minn., Albert Lea—Waterworks improvements, incl. extending 10 in. main to north side, under river, and 1 pump with motor. $35,000.

Minn., Brainerd—For 4,800 lin.ft. 6 in. c.i. pipe, 2 tons specials, 6 hydrants, 7 gates and boxes, 3 tons lead, for waterworks. $8,278. E. T. Fleenor, city clk.

Minn., Cyrus — Village complete waterworks. $20,000. W. E. Buell & Co., Insurance Exch. Bldg., Sioux City, Ia., engrs.

Mo., Monett—For 500,000 gal. steel stand pipe, $15,000. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, engrs.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., pumping plant, at Rondout Creek, with additional pumping equipment, pumps, at Croton Lake Gate House. $1,125,000.

Pa., Sharpsburg—Boro, H. J. Holman, clk., Municipal Bldg., 3 new water wells, appurtenances, improving existing wells. Former bids rejected. J. M. Rice, 247 Oliver Bldg., Pittsburgh, engr.

Tex., Beeville—Central Power & Light Co., Natl. Bank of Commerce Bldg., San Antonio, doubling capacity water supply, incl. drilling new 650 ft. well, installing new unit pumping equipment, 650 g.p.m. centrifugal type well pump, constructing pump house, concrete sandtrap, cascade aerator, automatic sprinkler. $75,000. Private plans.

Tex., Corpus Christi — City, c/o P. G. Lovenskiold, mayor, bids after May 10, reconstructing, repairing La Fruita Dam as water supply and power project, $400,000. R. J. Cummins, Bankers Mortgage Bldg., Houston, and Corpus Christi, engr. Noted Feb. 19.

Tex., Wichita Falls — Preliminary plans waterworks improvements, incl .reservoir, conduit line, extension to distributing system. $450,000. Address W. Nalton, mayor, or Montgomery & Ward, Wichita Falls, engrs. Noted Apr. 2.

Ont., Toronto—Replacing 8 boilers in John St. Waterworks Pumping Station. $203,000. R. C. Harris, City Hall, engr.

Que., Lauzon—Town Council expending $271,000, waterworks extensions.

BIDS ASKED

Calif., San Bruno—May 13, by E. A. Bohm, city clk., extending waterworks in 3rd addition incl. 6,000 ft. 2 in. welded iron and 1,570 ft. 4 in. c.i. pipe, nine 2 in. and seven 4 in. valves, 4 hydrants.

Ind., Valparaiso—May 1, by City Council, 500,000 gal. steel storage tank on 100 ft. tower, concrete found., 14 and 12 in. c.i. mains. $100,000. C. Dickover, Valparaiso, engr.

Ky., Louisville—May 20, by Louisville Water Co., reservoir, pipe lines. J. Chambers, ch. engr. and supt. Alvord, Burdick & Howson, Civic Opera Bldg., Chicago, Ill., engrs.; adv. E. N.-R. Apr. 30. Noted Feb. 26.

Mass., Reading—Town, Dpt. P. Wks., bids about May 1, 1 story, brick pumping station, near Grove St. $50,000. Weston & Sampson, 14 Beacon St., Boston, engrs. Noted Apr. 23.

Mich., Detroit—May 5, by Dpt. Water Supply, 735 Randolph St., superstructure waterworks intake at head of Belle Isle, incl. 54 x 127 ft. building, 25 ft. high to roof trusses, 120 tons structural steel, 98,000 glazed brick tile, 225,000 common brick, 7,741 cu.ft. cut stone, 1,789 cu.yd. granite, 28 cu.yd. rein.-con. slab, steel sash, metal doors, gypsum roof slabs, copper roofing. $150,000. G. H. Fenkell, 735 Randolph St., genl. mgr.

Minn., Redwood Falls — May 5, by City, F. P. Forbes, city clk., waterworks improvements, incl. 200,000 gal. reservoir, pump house, equipment, softening plant. L. P. Wolff, 903 Globe Bldg., St. Paul, consult. engr. Noted Mar. 19.

N. Y., Crawford — May 14, by Pine Bush Water Dist., at office G. W. Jamison, secy., waterworks. R. R. Shearer, 91 North Pearl St., Albany, engr.

N. Y., Long Island City — May 5, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains and transferring taps in Queens Blvd.

N. Y., New York—May 5, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Pelham Parkway N., Polo and Twiggs Pls., East 215th St., Croes, Fairfield, Feteley, Lacombe, Longstreet, Murdock, Nereid, Radcliffe, Randall and St. Lawrence Aves., Bronx Boro.

N. Y., Waddington—May 9, by Bd. Village Trustees, R. H. Thompson, clk., 100,000-200,000 gal. elevated tank, 21,000 ft. 6- to 10-in. c.i. pipe for distribution system, pump house. $50,000. W. T. Field, Watertown, engr. Noted Mar. 5.

N. D., Grand Forks—May 6, by C. J. Evanson, city aud., 11,192 lin.ft. 12 in. c.i. mains, thirty 12 in. gate valves on 8th Ave. and Washington St. $38,355.

N. D., Grand Forks—May 6, by City Council, C. J. Evanson, aud., Project 1122-D 11,192 lin.ft. 12 in. c.i. mains, thirty 12 in. gate valves. $35,355.

Pa., Cannonsburg—D. C. Morrow, mgr. Citizens Water Co., Washington, bids about May 22, 200 m.g. reservoir, 700 ft. earth dam, 35 ft. high, 40,000 cu.yd. excav., spillway, 500 cu.yd. concrete. $100,000. Private plans.

Pa., Pittsburgh—May 5, by City, E. G. Lang, dir. P. Wks., City Hall, Brilliant Pumping Station, 1 story, basement, sandstone, glazed tile, limestone, inside ceramic glazed tile, incl. valve chamber, heating, plumbing, at Aspinwall. $176,000. Private plans.

S. D., Huron—May 7, by J. F. White, secy., State Fair Bd., 2,200 lin.ft. 8 in. mains, valves, hydrants.

Wis., Racine—May 15, by Bd. Water Comrs., City Hall, low lift suction well and pumping station, filter addition and service building; tunnel; light and power wiring; valves; heating, plumbing; switchboard and motor control; cranes; pumps; pipe; venturi meter; inside pipe erection; filter equipment. Alvord, Burdick & Howson, 1401 Civic Opera Bldg., Chicago, Ill., engrs.; adv. E. N.-R. Apr. 30. Noted Feb. 26

Ont., St. Thomas—May 1, by A. Miller, city engr., overhauling, enlarging water filtration plant, incl. additional equipment. $90,000.

B. C., Vancouver—May 4, by City Council, furnishing 250 six in., 150 eight in. and 100 twelve in. hub end gate valves, 50 eight in., 30 twelve in. flanged gate valves. C. Brackenridge, City Hall, engr.

CONTRACTS AWARDED

Me., Portland — Trustees Portland Water Dist., furnishing, installing two 5 m.g. pump storage tanks, concrete founds., to Warren Steam Pump Co., East Main St., Warren, Mass. Noted Feb. 19.

Me., Portland—Portland Water Dist., 1 story, brick, stone pumping station, to C. W. Cunningham & Son, 181 State St.

Mass., Springfield — Bd. Water Comrs., 10 m.g. covered concrete reservoir, at Provin Mountain, Contr. 15, to D. H. Latham, Columbus, O., $171,459. Est. $300,000. Noted Mar. 26.

Mich., Detroit—Dpt. Water Supply, G. H. Fenkell, genl. mgr., 735 Randolph St., furnishing, installing chlorinators and chlorine piping at Springwells Filter Plant, to Wallace & Tiernan Co., Inc., 723 1st St., $23,988.

Mich., Detroit—D. C. Grobbell, acting secy. Dpt., Water Supply, superstructure concrete screen chamber, 74 ft. square, 47 ft. high, at Water Works Park, to Corrick Bros., 507 Owen Bldg., $61,420. Noted Mar. 26.

Minn., Minneapolis—F. S. Gram, city purch. agt., chlorine handling equipment for filter plant,

See proposal advertising on page 88

LEADITE

Trade Mark Registered U.S. Pat. Office

saves

~in cost of material~ caulking expenses~in digging bell holes~in pumping wet trenches~in freight charges~in handling charges~in fuel costs~by reducing leakage losses~in interest charges, by getting water in the line quickly~in installation charges.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

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Land Title Building Philadelphia, Pa.

100 LBS.
LEADITE
REG. U.S. PAT. OFF.
CEMENT
for JOINTING WATER MAINS
MANUFACTURED BY
THE LEADITE COMPANY
PHILADELPHIA, PA.

No Caulking

Waterworks (Continued)

to F. E. Satterlee Co., 118 Washington Ave. N., $3,312; automatic scales, to Toledo Scale Co., 300 North 7th St., $5,280; furnishing disc-type Federal meters, to A. P. Smith Mfg. Co., East Orange, N. J., ⅝ in. at $6.65 ea., ¾ in. $10.85, 1 in. $14.50 ea. and 2 in. $45; 1½ in. disc meter, to Pittsburgh Equitable Meter Co., 400 Lexington Ave., Chicago, Ill., $31.92 and all 2, 3, 4 and 6 in. compound meters. Noted Apr. 2.

Mont., Great Falls—City Council, filter house, clarification tanks, wash tanks, alterations to existing basin, and filter equipment to Lease & Leigland, Great Falls, $177,577 and $26,530 respectively; pump house, pumps, piping, valves, filters, settling basin, meters, to Allis-Chalmers Co., West Allis, Wis., $14,361. Noted Apr. 2.

N. J., Newark—North Jersey Dist. Water Supply Comn., 24 Commerce St., connecting mains from Little Falls Filter Plant to Wanaque Reservoir, to T. A. Gillespie & Co., 7 Dey St., New York, $22,433.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, access chambers, steel mains, to Manmill Constr. Co., 1780 Pitkin Ave., $12,565. Noted Apr. 2.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenues Q, T, X, etc., to Knidem Constr. Co., 4197 Park Ave., New York, $8,592. Noted Apr. 9.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 12th, 14th and 21st Aves., to Bronx Water Wks. Corp., 1 Riverdale Ave., New York, $16,468; 6 in. wells at Watts Pond Pumping Station, Nassau Co., to Riley Drilling Co., 280 Bway., New York, $14,759. Noted Apr. 9.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., core borings adjacent Boyd's Corners Dam, to Pennsylvania Drilling Co., 165 Bway., $4,655. Noted Apr. 2.

O., Youngstown — City, gate valves, fittings for expansion waterworks plant facilities, to Darling Valve Co., Williamsport, Pa., $27,240. Est. $25,000. Noted Apr. 9.

Tex., Henderson—City, c/o Secretary, 250,000 gal. steel storage tank, to Chicago Bridge & Iron Co., Eagle Ford Rd., Dallas; drilling deep water well, to Layne-Texas Co., 2nd Natl. Bank Bldg., Houston.

Wash., Olympia—City Dpt. P. Wks., C. L. Eufault, comr., 2½ m.g. concrete lined reservoir, saucer type, concrete gate chamber, to C. L. Creelman, 1079 25th St. N., Seattle, $26,416. Est. $30,000. Noted Dec. 4.

Wash., Wenatchee—City Comrs., furnishing, laying c.i. mains, to E. B. Link, Wenatchee, $25,576.

SEWERS

PROPOSED WORK

Calif., Signal Hill—City Council sewage disposal plant, collection system. $90,000. Currie Eng. Co., Anderson Bldg., San Bernardino, engr.

Conn., Middletown—Sewage disposal plant. $1,000,000. **Maturity July 1 or later.** T. F. Bowe, 110 William St., New York, consult. engr. Noted Feb. 5.

Ind., Ft. Wayne—Bd. P. Wks., City Hall, Main Street Sewer 64. $94,994. F. M. Randall, Ft. Wayne, engr.

Mass., Boston—City, Dpt. P. Wks., J. A. Rourke, comr., sewerage works, surface drains, catch basins, in Cartland St. and Glendale Ave., West Roxbury. $28,300.

Mass., Walpole—Town, bids within 6 or 8 weeks, sewerage system, incl. 4 mi. pipe line on Neponset River, also pumping equipment, 20, 24 and 30 in. pipe. $150,000. E. Worthington, 4 Pearl St., Dedham, consult. engr. Noted Mar. 26.

Mich., Detroit—City, concrete, steel liner plate relining existing section Southfield Sewer between Warren and Kirkwood Aves. $177,000. J. S. Stringham, city engr.

N. Y., Ardsley—Village soon takes bids vitr. clay pipe for sewerage system to connect with trunk sewer. $150,000. Total exceeds $300,000.

R. I., Providence—Sewer Dpt., sewerage works in Wyndham, Ansel and Delmar Ave., Kimball and Mattie Sts. $25,000.

BIDS ASKED

Ark., Blytheville—May 20, by Bd. Comrs. Sewer Impvt. Dist. 3, City Hall, sewers, manholes, flush tanks, sludge beds. E. J. Neaton, engr.; adv. E. N.-R. Apr. 30.

Ind., Seymour—May 4, by City Council, 3rd Street Relief Sewer. $75,000. J. Havenschild, Seymour, clk. Noted Mar. 18.

Massachusetts—Comrs. Middlesex Co., and J. H. Ritchie & Associates, archts., 250 Stuart St., Boston, taking bids sewage disposal system, at tuberculosis hospital. $25,000.

Mass., Lexington—May 1, by Comrs. Middlesex Co., Court House, East Cambridge, sewerage disposal system, hospital grounds, also 2 doctors residences. J. H. Ritchie & Associates, 250 Stuart St., Boston, archts. Est. $25,000.

N. Y., Brooklyn—May 7, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Delamere Pl., West 3rd St., Atkins and DeWitt Aves.

N. Y., Mount Pleasant—May 1, by Supervs. Westchester Co. Sanitary Sewer Comn., Court House Annex, White Plains, 8,100 ft. 14- to 24-in. c.i. trunk sewer Sect. B, Upper Bronx Valley Project.

N. Y., Waddington—May 9, by Bd. Village Trustees, R. M. Thompson, clk., 3.5 mi. sewers. $40,000. W. T. Field, Watertown, engr. Noted Mar. 5.

O., Akron—May 5, by F. E. Swineford, dir. P. Serv., Southern Outfall Sewer, 3,200 ft. 36 and 48 vitr. clay, brick or segmental block pipe. $90,000. A. B. Backherms, Municipal Bldg., engr.

O., Salem—Bd. Control bids about June 13, storm water sewers in Newgarden, Aenta and South Ellsworth Sts. $25,000. S. F. Barkhoff, Salem, engr.

Okla., Nichols Hills (Oklahoma City P. O.) —May 5, by T. A. Montague, city clk., septic tank, 7,600 ft. 8- to 12-in. vitr. clay sanitary sewers in Dist. 3. $26,000. Benham Eng. Co., Perrine Bldg., Oklahoma City, engrs.

Pa., Glenshaw — May 1, by C. E. Cathers, pres. Bd. Comrs. Shaler Twp., Maple Ave., 114,300 ft. 8- to 24-in. terra cotta sewers, 400 manholes, 64 lampholes, in Dists. 1, 2, 1-a, 2 and 3, near here. $150,000. F. G. Ross, 309 4th Ave., Pittsburgh, engr. Noted Apr. 17.

Tex., Dumas—May 4, by City, M. A. Turner, city clk., 57,270 ft. 6- to 12-in. vitr. clay sewers, disposal plant. $45,000. W. D. Howren, 800 Florida St., Amarillo, engr. Noted Mar. 26.

CONTRACTS AWARDED

Ind., Ft. Wayne—Bd. P. Wks., City Hall, Cottage Avenue Sewer, to Cecil D. Coil Constr. Co., 1332 Hayden St. Est. $26,900.

Me., Portland—City Purchasing Agent, City Hall, 2,287 ft. 8- to 30-in. c.i. sewers in Ocean Ave., Morse and Grafton Sts., and 1,430 ft. 12- to 15-in. sewer in Glecker Rd., to Chessi & Profenno Co., Portland; 2,500 sq.yd. redressed split granite block paving, to Richard Kennedy & Co., Inc., Portland. Est. $25,000. Noted Apr. 9.

Md., Baltimore—Bd. Awards, sanitary sewer, appurtenances, comprising triple conduit inverted syphon, Sanitary Contr. 279, to Marocco Contg. Co., 231 South Exeter St., $23,897. Noted Apr. 2.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sewerage works in Summer St. between C St. and Reserved Channel, to A. Grande, 60 Bradeen St., Roslindale, $18,545. Est. $25,000.

Mass., Swampscott — Town, Bd. Selectmen, Sect. B, sewerage system, to Videtta & Fabino, 143 South St., Lynn; Sect. C, to Corso & Materra, 8 Hillside Ave. Est. $25,000. Noted Mar. 5.

Miss., Jackson—Mississippi Building Comn., Jackson, sewerage system, waterworks at State Insane Hospital Rankin Co., near here, to B. E. Walker Constr. Co., Standard Life Bldg., $54,294.

N. Y., New York — Sanitary Comn., W. Schroeder, Jr., comr. Municipal Bldg., constructing preliminary and final settling tanks, aeration tanks, substructures, for operating galleries, preliminary and return sludge storage, and decantation tanks, with appurtenant pipes, conduits, drains, Contr. B, Sect. 2, in connection with construction Ward's Island Sewage Treatment Works, to W. H. Gahagan Co., Inc., 147 Remsen St., Brooklyn, $3,867,780. Noted Feb. 19.

Okla., Sulphur—B. Knox, city clk., new sewage disposal plant, to W. L. Scott, Sulphur, $37,928. Est. $45,000.

Va., Richmond—City Council, R. K. Compton, dir., supplying terra cotta pipe, to Sitterding-Carneal-Davis Co., 1500 West Moore St., at $8,018; sewer bricks, to Southside Brick Co., 20 North 8th St. $5,180; sewer castings, steps, to O. G. McGee & Son, 232 East Main St., $1,756. Grand total $14,954. Noted Mar. 19.

WASTE DISPOSAL

PROPOSED WORK

N. J. Irvington (br. Newark) — Town Council, Town Hall, preliminary plans 100 ton incinerator. $25,000 or more. I. Casey, Jr., town engr. Noted Apr. 16.

BRIDGES

PROPOSED WORK

Calif., Alameda — Bd. Comrs. Alameda Co., Oakland, 650 ft. bascule bridge, 40 ft. roadway, 6 ft. sidewalks over Oakland Estuary at 23rd Ave. connecting Park St. $700,000. G. A. Posey, Oakland, co. surv.

Mont., Malta—State Hy. Comn., Helena, Phillips Co., J. F. Roadhouse clk., Malta, Blaine Co., H. Bauer, clk., Chinook, Hill Co., E. J. Bronson, Havre, and Fergus Co., E. E. Dinnett, clk., Lewistown, steel, concrete, bridge over Missouri River. $440,000. Engr. Dpt., State Hy. Comn., Helena, engr.

Nev., Mesquite—State Hy. Dpt., Carson City, 19 span 950 ft. concrete or concrete, steel bridge on concrete pile found., Clark Co., near here. $100,000. S. C. Durkee, hy. engr.

N. J., Freehold—Bd. Freeholders Monmouth Co., Court House, preliminary plans 2 bridges, one on road from Englishtown to Manalopan, other on Allentown-New Egypt Rd. $25,000. G. K. Allen, 60 Broad St., Red Bank, co. engr.

N. J., Manasquan — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., steel, concrete viaduct over Stockton Lake and Sea Girt Ave. $350,000. **Maturity probably soon.**

Okla., Hominy—Bd. Comrs. Osage Co. preliminary plans 8 span 120 ft. rein.-con. bridge over Hominy River. $27,000. W. H. Clark, Pawhuska, engr.

Texas—State Hy. Comn., W. R. Ely, chn., Austin, **(F.A.P. means Federal Aid Project)**, steel, concrete bridge and relief openings over Nueces River on Hy. 12, F.A.P. 429-C, Jim Wells Co., $245,000—concrete bridge over Bois D'Arc Creek and 2 relief openings on Hy. 5, F.A.P. 464, Fannin Co., $50,000—steel, concrete, creosoted timber pile trestle bridge over Red River, Hy. 23, State Aid Project 928-E, Wilbarger Co., $150,000.

Texas—G. Gilchrist, state hy. engr., Austin, rejected bids Apr. 1, 5 steel, concrete, timber pile trestle bridges on Hy. 43, Federal Aid Project 453-J, $100,000; also grading, drainage structures 1.844 mi. same hy., 26 ft., $30,000, both Leon Co. Will readvertise. Noted Mar. 26 Daily.

Tex., Beaumont—City and Southern Pacific Ry. Co., R. W. Barnes, Houston, Tex., ch. engr. (Southern Pacific Lines in Texas and Louisiana), preliminary plans steel, rein.-con., timber railway viaduct over city. $3,500,000.

Ont., Sudbury — Soon takes bids two 100 ft. rein.-con. hy. bridges over Nolin-Creek, 1 at Beech St., other at Elm St. $25,000. W. McMullen, Mackie Bldg., engr.

BIDS ASKED

California — May 13, by State Hy. Comn., Sacramento, removing deck of seven 164 ft. 6 in. through steel truss spans of bridge, across Santa Ynez River, 1 mi. south of Bulleton, constructing laminated timber floor, surfacing with bituminous macadam, Santa Barbara Co.; replacing three 60 ft. 3 in. steel truss spans with concrete girder spans, widening rein.-con. girder approach spans incl. two 31 ft., eight 30 ft. and two 21 ft. girder approach spans of bridge over Santa Ana River, 2 mi. north of Newport Beach, Orange Co. C. H. Purcell, hy. engr.

Calif., Eureka—May 12, by F. M. Kay, clk. Humbold Co. 90 ft. rein.-con. bridge over Eaton Slough near Ferndale; 88 ft. rein.-con. bridge over North Fork Mattole River at Petrolia. F. Kelly, Eureka, co. surv.

Calif., Helena—May 6, by C. H. Purcell, engr. State Hy. Comn., Sacramento, bridge to have one 150 ft. through steel truss span and two 47 ft. concrete girder spans on concrete piers, abutments, over North Fork Trinity River, near here, Trinity Co.

Calif., San Francisco—June 17, by Directors Golden Gate Bridge & Hy. Dist., 722 Financial Center Bldg., Contr. 1, steel superstructure, involving 75,000 tons structural steel, 28,000 tons cables and fastenings; Contr. 2, main piers; Contr. 3, anchorages; Contr. 4, San Francisco and Marin approach spans; Contr. 5, Presidio Rd.; Contr. 6, Sausalito Rd.; Contr. 7, paving main and approach spans; Contr. 8, electric work; Contr. 9, cable housing and stairways, filling and grading; Contr. 10, toll terminals; Contr. 11, cement, $35,000,000 voted to finance same. Strauss Eng. Corp., 307 North Michigan Ave., Chicago, Ill., engrs. Noted Dec. 18.

Illinois—May 12, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, seven 60 ft. span rein.-con. girder bridge, Route 9, Sect. 48B, Dist. 4, Peoria Co.—one 64 ft. twenty-three 95 ft., and six 83 ft. span steel superstructure on rein.-con. substructure, Route 46, Sects. 462V-B and C, Dist. 1, Cook Co.—eight 50 ft. I-beam approach spans on concrete piles, rein.-con. substructure, Route 48, Sect. 135B—125 ft. span steel superstructure, Route 48, Sect. 135C—two 40 ft. span rein.-con. girder bridge, Route 48, Sect. 136 B, all Dist. 6, Christian Co.—three 49 ft. span rein.-con. girder bridge, Route 54, Sect. 544H, Dist. 1, DuPage Co.—rein.-con. substructure, Route 69, Sect. 124B—two 116 ft. and two 67 ft. span steel superstructure, Route 69, Sect. 124-C—five 75 ft. span rein.-con. arch bridge, one 24 ft. and one 16 ft. span rein.-con. slab bridge, Route 69, Sect. 125B, rein.-con. culvert, all Dist. 3, La Salle Co.—one 16 ft. and two 20 ft. span rein.-con. slab bridges, one 40 ft. rein.-con. girder bridge, Route 69, Sect. 126B, Dist. 3, Kendall Co.—one 26 ft. and two 45 ft. spans, Route 72, Sect. 119B, Dist. 2, Ogle Co. —five 55 ft. and twelve 12 ft. span rein.-con. girder bridge, also three 12 x 12 ft. rein.-con. culverts, Route 70, Sect. 102B, Winnebago Co.—40 ft. and one 50 ft span rein.-con. slab bridges, Route 110, Sect. 114B, Dist. 8, Macoupin Co. — four 50 ft. span rein.-con. girder bridge, two 50 ft. span rein.-con. substructure, 2 rein.-con. girder approach spans, Route 129, Sect. 107B—125 ft. steel superstructure, Route 129, Sect. 107C, both Dist. 7, Effingham Co.—two rein.-con. substructures, four 50 ft. rein.-con. approach spans, Route 148, Sect. 129B—two 170 ft. and one 70 ft. span steel superstructure, Route 148, Sect. 129C, all Dist. 9, Williamson Co.—three 35 ft. span rein.-con. girder bridge, and two steel I-beam bridges, each three 40 ft. span on concrete piles, Route 157, Sect. 117B, Dist. 8, Madison Co.—one 45 ft. and three 45 ft. span rein.-con. girder bridges, one 30 ft. span rein.-con. slab bridge, rein.-con. substructure, Route 173, Sect. 134B, Dist. 1, Lake and McHenry Counties—185 ft. steel superstructure, Route 173, Sect. 134C, Lake Co. F. T. Sheets, ch. hy. engr.

Kentucky—See "Streets and Roads."

Maine—May 5, by State Hy. Dpt., Augusta, concrete, steel bridge over Androscoggin River between Brunswick and Topsham, for State, Cumberland and Sagadahoc Counties and Towns of Brunswick and Topsham. To exceed $25,000.

Maryland—May 5, by State Roads Comn., G. C. Uhl, chn., Baltimore, extensions to 2 bridges, Contr. P-173-311, Prince George's Co.; extensions to 2 bridges, Contr. P-172-311, Prince George's Co.; adv. E.N.-R. Apr. 30.

Mississippi—See "Streets and Roads."

Montana—See "Streets and Roads."

New Jersey—May 4, by State Hy. Comn., Trenton, viaduct to carry Route 4, Sect. 3, across Palisade Ave., West Shore R.R. and Windsor Rd., Teaneck, Bergen Co.; viaduct to

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Bridges (Continued)

carry Route 4, Sect. 3, across Dean St., Northern R.R. of New Jersey, and Hasse Pl., Englewood, Bergen Co. A. L. Grover, ch. engr.

N. J., Elizabeth—May 4, by Bd. Freeholders Union Co., Court House, double leaf bascule bridge over English River, Sumner St. $50,000. R. Collins, Court House, co. engr. Noted Feb. 5.

N. J., Keyport—See "Streets and Roads."

New York—May 5, by A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, construction Queens Anchorage, Triborough Bridge, connecting Manhattan, Bronx and Queens Boros. Former bids rejected. Also dike across Bronx Kills. Noted Mar. 19.

New York—May 5, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York reconstructing Purdy's Bridge in Croton Watershed.

O., Cleveland—May 1, by Bd. Comrs. Cuyahoga Co., rein.-con. bridge, Wolf Rd., stand pipe rail $86,376, stone rail $93,141. A. M. Felgate, Court House, engr.

Pa., Pittsburgh—May 5, by City, E. G. Lane, dir., City-County Bldg., 308 ft. steel, concrete bridge, incl. 210 ft. truss span and three short spans, over Pennsylvania R.R., on 28th St. C. M. Reppert, City-County Bldg., engr.

Texas and Oklahoma—May 5, by G. Gilchrist, state hy. engr., Austin, Tex., 3,705 ft. concrete, steel I-beam bridge over Red River, Hy. 23, State Aid Project 928-E, Wilbarger Co. Tex., between Vernon Texas and Elmer, Okla., for Texas State Hy. Comn., Austin, Tex. and Oklahoma Hy. Comn., Oklahoma City, Okla. Est. $160,000. Noted Feb. 19.

West Virginia—May 5, by State Roads Comn., Charleston, Conway Bridge 1236, incl. one 175 ft., one 82 ft., one 50 ft., and two 40 ft. spans; steel deck superstructure only Project 180-B Marion Co. E. D. Yewell, engr.

W. Va., Wayne—May 4, by Bd. Comrs. Wayne Co., 40 ft., span rein.-con. or steel bridge, concrete or cement rubbel substructure over Whites Creek at Auxier Farm, Ceredo Co. H. O. Wiles, co. road engr.

CONTRACTS AWARDED

California—State Hy. Comn., Sacramento, steel stringer overhead crossing over Atchison, Topeka & Santa Fe R.R., incl. thirty-one 40 ft. and seven 20 ft. spans with rein.-con. deck on steel pile bents, steel frame bents on concrete footings, wood pile found., 24 ft. roadway, grading, concrete paving approaches 20 ft. wide, near Merced Co to ..M. B. McGowen, 74 Montgomery St., $102,400. Noted Mar. 19.

Calif., Santa Barbara—Bd. Supervs. Santa Barbara Co., steel bridge with rein.-con. deck over San Roqui Creek, on Goleta Foothill Blvd., to C. B. Davidson, 1517 Santa Fe Ave., $47,945. Noted Apr. 9.

Idaho—See "Streets and Roads."

Idaho—A. Harbour, comr. P. Wks., Boise, 506 ft. steel viaduct over Plummer Creek, and 2 concrete culverts, Benewah Co., to H. E. Shraven, Boston Bldg., Salt Lake City, $47,929 est. $49,071; Montgomery Bridge, a timber trestle, 1,016 ft. long, over Snake River near Rupert, Minidoka and Cassia Counties, to J. H. Forbes, Caldwell, $38,111 est. $42,388. Noted Apr. 3 Daily.

Indiana—State Hy. Comn., Indianapolis, Contr. 402, 150 ft. span steel truss bridge, White Co., to E. R. Campbell, Sandborn, $10,623 est. $13,115—Contr. 400, 84 ft. plate girder bridge, Porter Co., to Elkhart Bridge & Iron Co., Elkhart, $36,213 est. $44,991—Contr. 401, 60 ft. span rein.-con. arch bridge, Grant Co., to A. B. Hash, Sandborn, $11,580 est. $16,106—Contr. 403, one 32 ft. span and one 40 ft. span rein.-con. plate girder bridge, White Co., to R. L. Schutt, 5818 New York St., Indianapolis, $12,485 est. $16,295—Contr. 404, 50 ft. span rein.-con. arch bridge and rein.-con. overhead crossing, Vermillion Co., to R. McCalman, Inc., Danville, Ill., $33,915 est. $46,194—Contr. 405, 40 ft. span and 84 ft. span steel truss and concrete bridges, Lake Co., to E. E. Muzzall & Sons, Crown Point, $25,151 est. $33,524—Contr. 408, 16 ft. span rein.-con. slab bridge, Boone Co., to J. W. Kernodle, Lebanon, $4,275 est. $5,891—Contr. 410, 49 ft. rein.-con. girder overhead crossing, Laporte Co., to H. Thorp, Fountain City, $17,774 est. $21,844. Grand total $152,016. Noted Apr. 9.

Indiana—State Hy. Comn., Indianapolis, 28 ft. span rein.-con. girder bridge with 24 ft. roadway over Williams Ditch, 32 ft. span rein.-con. bridge, 24 ft. roadway over Louis Ditch, 36 ft. span rein.-con. arch bridge, 24 ft. roadway over Wolf Creek, one 15 ft. and one 84 ft span steel truss bridge, 22 ft. roadway over Bear Creek, all Jay Co., to E. A. Mariani & Co., Richmond, $30,802. Est. $42,802. Noted Jan. 15.

Ind., Elkhart—Indiana State Hy. Comn., Indianapolis, rein.-con. bridge over Elkhart River, on Middlebury St., to Bontrager Constr. Co., Elkhart, $38,900. Est. $70,000. Noted Mar. 19.

Michigan—J. T. Sharpensteen, Escanaba, div. engr., F. A. Br. 2 of 17-10-5, for State Hy. Comn., Lansing, Contr. 1, to Elkhart Bridge & Iron Co., Elkhart, Ind., $4,350; Contr. 3, to W. Toebe, Shingleton, $30,674, incl. cement. Noted Mar. 19.

Minnesota—State Hy. Dpt., St. Paul, Bridge 5050, 3 span, rein.-con., State Project 9-40-2, near Luverne, to Widell Co., Mankato, $32,789.

Missouri — State Hy. Bd., Jefferson City, bridges over Bourbeuse River, and over Dry Fork, Gasconade Co., to R. E. Martin, Cotton States Bldg., Nashville, Tenn., $26,616 and $22,148 respectively. Noted Dec. 11.

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New York—A. W. Brandt, comr. Hys., Albany, bridges in Broome Co., to Scott Bros. Constr. Co., Inc., Rome, $67,065 est. $92,754—Albany Co., to D. B. Riggs, Troy, $62,497 est. $79,888—Jefferson Co., to C. W. Wood, Buffalo, $23,587 est. $31,117—Allegany Co., to W. L. Collins, Hornell, $66,766 est. $89,763—Ulster Co., to A. M. Goldsmith, Grand Central Terminal, $16,484 est. $19,572—catwalks, ladders, dust shields, manholes, Nassau Co., to Bailey Constr. Co., Phillipsburg, Pa., $2,975 est. $3,195. Grand total $238,374. Noted Mar. 19.

North Carolina—State Hy. Comn., Raleigh, rein.-con. bridges, culverts, Chatham Co., to J. S. Bowers, Whiteville, $69,115—Macon Co., to L. Riddle Co., Asheville, $29,582— Gaston Co., to R. H. Blackwell, Kingsport, Tenn., $71,479—Edgecombe Co., to T. A. Loving & Co., Goldsboro, $83,762—Yadkin Co., to Elliott Building Co., Hickory, $46,803. Grand total $300,741.

South Carolina—State Hy. Dpt., Columbia, 4 rein.-con. structural steel, treated timber bridges, Beaufort Co., to Florida Bridge & Constr. Co., Orlando, Fla., $13,193 — rein.-con. overhead bridge over railroad, Chesterfield Co., to Newell Contg. Co., Greenville, S. C., $12,050—rein.-con. bridge, Darlington Co., to Palmer Constr. Co., Florence, $5,719—4 rein.-con., structural steel, treated timber bridges, Kershaw Co., to Kiker & Yount, Reidsville, N. C., $23,769—rein.-con., structural steel, treated timber overhead bridge, Lee Co., to Hooks & Mandenhall, Charlotte, N. C., $6,761 — rein.-con., structural steel, treated timber overhead bridge, Unioin Co., to B. F. Ramseur, Blacksburg, $6,667—rein.-con. bridge, Williamsburg Co., to J. S. Bowers, Whiteville, N. C., $10,790—raising existing 1,335 ft. treated timber bridge and constructing 825 ft. extension to bridge over Black River, Williamsburg Co., to George A. Thomason & Co., Greenwood, $22,688. Grand total $101,637.

Oregon—State Hy. Dpt., Salem, bridge over Cape Creek, Lane Co., to J. K. Schram, Salem, $116,980. Noted Apr. 2, under "Streets and Roads."

West Virginia—See "Streets and Roads."

STREETS AND ROADS

BIDS ASKED

California—May 6, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, concrete paving 1.4 mi. road between Power House and Auburn, Placer Co.; heavy fuel oil treating 10.1 mi. road between Chualar and Salinas, 8 ft. wide on each side existing pavement, Monterey

Calif., Oakland—May 7, by F. C. Merritt, city clk., grading, curbing sidewalks, 7- to 9-in. concrete paving 395,820 sq.ft. Hopkins St. between High St. and 5th Ave. $100,000. W. Frickstad, city engr.

Calif., Sonora — Bd. Comrs. Tuolumne Co. taking bids grading, improving Fuller-Longway Rd., et al., incl. 26,900 cu.yd. excav., 255 cu.yd. concrete (bridge and cattle passes), 1,402 lin.ft. 12 in. and 75 lin.ft. 16- to 36-in. galvanized iron pipe, R. D. Strauch, Sonora, co. surv.

Calif., Yreka—H. F. Brown, city clk., taking bids grading 131,650 cu.yd., 1½ in. asphaltic concrete on 3½ in. asphaltic concrete, or 3- to 7-in. hydraulic concrete paving with expansion joints every 50 ft., 131,000 sq.ft.

Illinois—May 12, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete, bituminous filled brick on concrete or bituminous concrete either fine or course graded aggregate type on concrete surfacing 0.4 mi Route 2, Sect. 28R, Dist. 7, Marion Co.—0.62 mi. Route 4, Sect. D-RS, Dist. 6—0.88 mi. Route 4, Sect. L-RS, Dist. 6, both Sangamon Co.—0.17 mi. Route 4, Sect. 63X, Dist. 8—7.84 mi. Route 157, Sect. 117, Dist. 8, both Madison Co.—0.25 mi. Route 8, Sect. T-X Dist. 3, Bureau and La Salle Counties—0.9 mi. Route 8, Sect. 10—0.5 mi. Route 9, Sect. 46—0.29 mi. Route 9, Sect. 46X—0.28 mi. Route 9, Sect. 48, all Dist. 4 Peoria Co.—2.1 mi. Route 12, Sect. 9X, Dist. 7, Richland and Clay Counties—1 mi. Route 22, Sect. 11Y, Dist. 1, Cook Co.—7.32 mi. Route 47, Sect. 105, Dist. 1, McHenry Co.—4.24 mi. Route 47, Sect. 106 Dist. 1, Kane and McHenry Counties—0.74 mi. Route 47, Sect. 119X, Dist. 3, Grundy Co.—8.78 mi. Route 48, Sect. 135—7.04 mi. Route 48, Sect. 136, both Dist. 6, Christian Co.—7.35 mi. Route 48, Sect. 137, Dist. 6, Montgomery and Christian Counties—6.93 mi. Route 53, Sect. 532, Dist. 1, DuPage and Cook Counties—4.43 mi. Route 53, Sect. 534X, Dist. 1, DuPage Co.—0.4 mi. Route 53, Sect. 537X, Cook Co.—4.75 mi. Route 57, Sect. 104, Dist. 1, Lake Co.—13.31 mi. Route 67, Sect. 119, Dist. 1, McHenry Co.—6.98 mi. Route 69, Sect. 125—6 mi. Route 89B, Sect. 105—1 mi. Route 178, Sect. 106, all Dist. 3, La Salle Co.—5.25 mi. Route 69, Sect. 126, Dist. 3, Kendall Co.—8.12 mi. Route 72, Sect. 119—5.52 mi. Route 77, Sect. 104, both Dist. 2, Ogle Co.—10.2 mi. Route 80, Sect. 110, Rock Island Co.—0.54 mi. Route 88, Sect. 126, Dist. 4, Peoria Co.—1.39 mi. Route 91, Sect. 108X-1, Dist. 4, Knox Co.—5.05 mi. Route 100, Sect. 116, Dist. 6, Morgan and Scott Counties—4.98 mi. Route 110, Sect. 114, Dist. 8, Macoupin Co.—8.58 mi. Route 133, Sect. 119, Dist. 5, Moultrie Co.—0.94 mi. Route 140, Sect. 110X, Dist. 7, White Co.—0.51 mi. Route 142, Sect. 113X, Dist. 7, Jefferson Co.—7.08 mi. Route 173, Sect. 129, Dist. 2, Winnebago and Boone Counties—10.76 mi. Route 173, Sect. 134, Dist. 1, McHenry and Lake Counties—grading, drainage structures 0.31 mi. Route 51, Sect. 511V-A, Dist. 1, Cook Co.—0.82 mi. Route 69, Sect. 124A, Dist. 3, La Salle Co.—1.5 mi. Route 70, Sect. 102A, Dist. 2, Winnebago Co.—7.96 mi. Route 129, Sect. 107A, Dist. 7, Effingham Co.—1.39 mi. Route 148, Sect. 129A, Dist. 9, Franklin and Williamson Counties—4.46 mi. Route 150, Sect. 132A, Dist. 9, Union Co.—4.47 mi. Route 151, Sect. 114A, Dist. 9, Jackson Co.—4.7 mi. Route 159, Sect. 130A, Dist. 8, St. Clair Co. Owner furnishes cement. F. T. Sheets, ch. hy. engr.

Ill., Rock Island—May 4, by Bd. Comrs. Rock Island Co., concrete surfacing 1.0524 mi. Sect. 12-15D, 18 ft.

Indiana — May 5, by State Hy. Comn., Indianapolis **(F.A.P. means Federal Aid Project)** grading, drainage structures, metal shoulders, expansion joints, reinforcing steel bars, concrete surfacing 130,311 sq.yd. Rd. 22, F. A. P. 219-A Howard and Grant Counties—143,041 sq.yd. Rd. 43 from Raccoon to Crawfordsville, F. A. P. 202-B Montgomery and Putnam Counties — 168,436 sq.yd. Rd. 43 from Greencastle to Raccoon, F. A. P. 202-A Putnam Co.—161,334 sq.yd. Rd. 2 from Hebron to Valparaiso, F. A. P. 244 Porter Co.—138,518 sq.yd. Rd. 29 from Thornhope to Logansport, F. A. P. 238-B Cass Co., incl. 19,360 lin.ft. guard rail. All above roads, 20 ft. wide. J. J. Brown, dir.

Indiana—May 5, by State Hy. Comn., Indianapolis **(F. A. P. means Federal Aid Project)**, concrete, bituminous concrete or brick surfacing 2.572 mi. State Rd. 40 from point 2 mi. east of Richmond to Ohio State Line, F.A.P. 112 Wayne Co.—6.743 mi. State Rd. 50 from Loogootee to Shoals, F.A.P. 115-B, Martin Co.—14.13 mi. State Rd. 43 from Greencastle to Raccoon, F.A.P. 202-A Putnam Co. — 11.851 mi. State Rd. 43 from Raccoon to Crawfordsville, F.A.P. 202-B Putnam and Montgomery Counties — 11.202 mi. State Rd. 22 from Kokomo to point 1 mi. west of Howard-Grant Co. Line, F.A.P. 219-A Howard Co.—10.991 mi. State Rd. 22 from point 1 mi. west of Howard-Grant Co. Line Rd. to State Rd. 9, F.A.P. 219-B Howard and Green Counties—11.739 mi. State Rd. 29 from Thornhope to Logansport, F.A.P. 238-B Cass Co.—13.74 mi. State Rd. 2 from Hebron to Valparaiso, F.A.P. 244 Porter Co. State furnishes cement except for concrete right-of-way markers and rein.-con. pipe. J. J. Brown, dir.

Ind., English—May 4, by Bd. Comrs. Crawford Co., rock surfacing James E. Johnson and E. Critchfield Rds. $25,019. J. Spears, English, aud.

Ind., Evansville—May 7, by Bd. Comrs. Vanderburgh Co., curbing, guttering, grading, asphaltic concrete on 7 in. concrete paving 16,460 sq.yd. Northwest Riverside Dr. and Ohio St. $91,770. M. Saunders, Courthouse, engr.

Ind., Kokomo—May 7, by Bd. Comrs. Howard Co., applying 10,000 gal. tar, 10,000 gal. cut back asphalt and 10,000 gal. road oil on hys. $30,000. G. W. Studebaker, Kokomo, aud.

Ind., Madison—May 4, by Bd. Comrs. Jefferson Co., concrete surfacing 25,170 ft. Deputy Co. Unit Rd., 18 ft. $26,922.

Ind., Princeton—May 5, by Bd. Comrs., Gibson Co., concrete surfacing E. Bertram Rd., $31,702; H. S. Romerhausen Rd., $22,115. S. G. Marshall, Princeton, aud.

Ind., Shelbyville — May 5, by Bd. Comrs. Shelby Co., concrete surfacing 9,600 ft. M. G. Talbert Rd. $40,685. G. A. Parrish, Shelbyville, aud.

Ind., South Bend—May 4, by Bd. Comrs. St. Joseph Co., improving Edison Rd., $43,000—Spring Street Rd., Penn Twp., $10,700 —Geranium Rd., Penn Twp., $77,800. F. P. Crow, South Bend, aud.

Ind., Washington—May 5, by Bd. Comrs. Daviess Co., concrete surfacing E. A. Kretz Rd. $27,685. R. M. Moren, Washington, aud.

Ia., Montezuma — May 5, at office Auditor Poweshiek Co., grading, incidental work 24.07 mi. trunk and local roads, 5.8 mi. side casting, placing 5,030 lin.ft. culvert pipe.

Kentucky—May 27, by State Hy. Dpt., Frankfort, grading, drainage structures 4 mi. Hardinsburg-Leitchfield Rd., Breckenridge Co.—7.7 mi. Princeton-Shady Grove Rd., Caldwell Co.—4.8 mi. Murray-New Concord Rd. Calloway Co.—3.5 mi. Leitchfield-Hardinsburg Rd., Grayson Co.—11.2 mi. Beattyville-Zachariah Rd., Lee Co.—2.5 mi. Smithland-Eddyville Rd., Livingston Co.—2.2 mi. Eddyville-Smithland Rd., Lyon Co.—11.2 mi. Mayfield-Brewers-Egners Ferry Rd., Marshall Co.—7.7 mi. Owenton-Dry Ridge Rd., Owen Co.—surfacing 6.5 mi. Cynthiana-Brooksville Rd., from Oddville to Claysville—3.5 mi. same road from Claysville to Bracken Co. line, both Harrison Co. — bridge over Kentucky River at Gratz, incl. one 275 ft. and two 100 ft. steel truss spans, eight 50 ft. and two 33 ft. steel plate girder spans, steel bents, towers, rein.-con. piers, abutments, retaining walls, Henry and Owen Counties. B. Johnson, chn.

La., Tallulah—May 6, by Police Jury Madison Co., grading, culverts, gravel surfacing 2.5 mi. Tendal-Scratchankle Rd. P. O. Benjamin, Tallulah, engr.

Maryland—May 5, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete shoulders 3.05 mi. Contr. D-81-111, Dorchester Co.—concrete paving 4.03 mi. Contr. H-117-42, Harford Co.—1.96 mi. Contr. W-92-64, Washington Co.—macadam paving 1.09 mi. Contr. Ho-46-54, Howard Co.—concrete surfacing, contract curb and concrete shoulders, Rhode Island Ave., Contr. P.174-311, Prince Georges Co.; adv. E.N.-R. Apr. 30.

Massachusetts—May 5, by Dpt. P. Wks., State House, Boston, grading, bitulithic on gravel surfacing 4,650 ft. hy. Spencer—bitulithic concrete paving 9,800 ft. hy. East Bridgewater—

Streets and Roads (Continued)

bituminous macadam paving 4,900 ft. Hancock—2,000 ft. Charlton—3,250 ft. Gardner. A. W. Dean, Dpt. P. Wks., Boston, engr.

Mass., Boston — May 1, by Dpt. P. Wks., J. A. Rourke, comr., recut granite block paving Congress St. $25,000.

Mass., Newburyport — See "Contracts Awarded."

Michigan—May 5, by A. L. Burridge, div. engr., Cadillac, grading, drainage structures 7.841 mi. FO35012, Contr. 1, Iosco Co., for State Hy. Comn., Lansing.

Michigan—May 5, by A. L. Burridge, div. engr., Cadillac, sheet asphalt on gravel resurfacing and building up shoulders, 11.713 mi. FO72-9C-2, Roscommon Co., 20 ft., for State Hy. Comn., Lansing.

Michigan—May 5, by W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, grading, shaping, drainage structures, concrete paving 2.086 mi. FO34-10, Contr. 5, 20 ft., Ionia Co., for State Hy. Comn., Lansing.

Michigan—May 6, by H. W. Hagaman, div. engr., 208 Kresge Bldg., Port Huron, grading, shaping, drainage structures, 20 ft. concrete surfacing 7.096 mi. FO32-37, Contr. 2, Huron Co., for State Hy. Comn., Lansing.

Michigan—May 6, by H. W. Hagaman, div. engr., 208 Kresge Bldg., Port Huron, grading, constructing 23 ft. T-beam culvert, 0.094 mi. MO79-38 Contr. 1, Tuscola Co., for State Hy. Comn., Lansing.

Michigan—May 7, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, 16 ft. 2-course gravel surfacing and 27 ft. T-beam culvert, 0.066 mi. MO73-35 Contr. 1, for State Hy. Comn., Lansing.

Mich., Hillsdale—May 6, by Hillsdale Co. Road Comn., 7 rein.-con. culverts on 2½ in. road. F. F. Rogers, Hillsdale, co. engr.

Minnesota—May 5, by State Hy. Dpt., 1246 University Ave., St. Paul, **(S.P. means State Project)**, concrete paving 220,500 sq.yd. S. P. 64-24 Div. A—grading, incl. portable, monolithic culverts 262,000 cu.yd. S. P. 2-41—126,000 cu.yd. S. P. 8-25—214,000 cu.yd. S. P. 9-30-2—358,000 cu.yd. S. P. 23-28-1. State furnishes cement.

New Hampshire—May 7, by State Hy. Dpt., Concord, grading, 4 in. crushed gravel on 12 in. gravel paving 3.96 mi. Gorham Hill Rd., Jefferson, 21 ft. $73,000.

New Jersey—May 4, by State Hy. Comn., Trenton, grading, bridging 8 in. rein.-con. paving 97,936 sq.yd. Route 40, Sect. 6, Buddtown-Four Mile Rd., Ocean Co. line, Burlington Co. A. L. Grover, ch. engr.

New Jersey—May 11, by State Hy. Comn., Trenton, grading, curbing, guttering, rein.-con., granite block and sheet asphalt paving 1.847 mi. Calhoun St. extension, in city of Trenton, Ewing and Trenton Twps., Mercer Co. A. L. Grover, ch. clk.; adv. E. N.-R. Apr. 30.

N. J., East Orange—May 11, by Bd. City Comrs., City Hall, sheet asphalt on old concrete paving 7,800 sq.yd. South Harrison St., and 2,700 sq.yd. South 20th St. $50,000. E. Willigerod, city engr.

N. J., Imlaystown—May 2, by Twp. Com. Upper Freehold, grading, slag or trap rock and penetration macadam on 4 in. concreted slag paving 8,100 sq.yd. Allentown Crosswicks Rd. $25,000. A. D. Bullock, 128 West State St., Trenton, engr.

N. J., Keyport—May 11, by Boro Council, rein.-con. on existing found., paving 8,070 sq.yd. Lloyd Rd., Keyport Boro, Raritan and Matawan Twps. Allen & Randolph, 60 Broad St., Red Bank, engrs.; adv. E. N.-R. Apr. 30.

N. J., Little Ferry — May 5, by Bd. Boro Council, Boro Hall, grading, rein.-con., sheet concrete or tarvia penetration paving Picken St. $25,000. McClave & McClave, 600 Gorge Rd., Cliffside, engrs.

N. J., Newark—May 5, by Bd. Freeholders Essex Co., Hall of Records Bldg., 9 in. rein.-con. on earth subgrade paving 15,880 sq.yd. Swamp Rd.-Dutch Lane, Caldwell and West Caldwell Boros. $25,000 or more. W. Stickles, Hall of Records Bldg., co. engr.

N. J., New Brunswick—May 5, by Bd. City Comrs., City Hall, pre-mixed bituminous macadam paving Bucclench Park. $25,000 or more. A. Atkinson, city engr.

N. J., Rumson—May 14, by Boro Council, rein.-con. on existing paving 5,874 sq.yd. Fair Haven Rd. Allen & Randolph, 60 Broad St., Red Bank, engrs.; adv. E. N.-R. Apr. 30.

N. Y., Brooklyn—May 7, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, asphalt on 6 in. concrete paving Blake Ave., Bergen, East 28th, Pennsylvania and 3rd Sts.; grading, curbing, flagging East 45th, East 96th, and Linwood Sts.—grading, 3 in. asphalt block on 6 in. concrete paving and asphalt on 6 in. concrete paving 74th St.

N. Y., Long Island City—May 4, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., sheet asphalt on concrete paving Northern Blvd., 30th, 38th, 41st, 21st, 23rd, and 153rd Sts., 30th, 35th, 31st, 36th, 21st, 37th, Cornelia and 49th Aves. — grading, curbing, sheet asphalt on prepared macadam paving Little Neck Parkway, North Hempstead Turnpike, Cross Island Blvd., Willets Point and Whitestone Rds., Ocean and 49th Aves.—grading, sidewalks, guttering 110th and 111th Sts.—restoring sidewalks Corona Ave.—strengthening water conduits intersection Lefferts and North and South Conduit Blvds.

N. Y., New Rochelle — May 8, by C. MacDonald, engr. Westchester Co., Court House, White Plains, grading, curbing, sidewalks, concrete paving 14,900 cu.yd. North Ave. from Eastchester Rd. to Coopers Corners, Co. Rd. 101; adv. E. N.-R. Apr. 30.

N. Y., New York—May 1, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, granite block on concrete paving East 165th, West 261st, East 141st and East 166th St.—sheet asphalt on concrete paving Colden, Paulding, Thieriot Aves.—grading, curbing, sidewalks on East 231st St., Ellison and Edwards Aves. — sewer in Fish and Matthews Aves.

N. Y., New York—May 7, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., granite block on concrete repaving Whitlock Ave.—asphalt block on concrete paving East 150th St.—grading, sheet asphalt on concrete paving East 174th St.—grading, curbing, Stadium and Dean Aves.—sewers in Bell and Duryea Aves.

N. Y., New York—May 7, by S. Levy, pres. Manhattan Boro, Municipal Bldg., repairing wood block, granite block and oak key block pavements in railroad area—grading, widening, sheet asphalt on concrete repaving 25th St.—grading, granite block on concrete paving West 13th and Staff Sts.

N. Y., St. George—May 6, by J. A. Lynch, pres. Richmond Boro, Boro Hall, grading, concrete paving widened area Arthur Kill Rd. from Arden Ave. to Woodrow Rd.

N. Y., White Plains—May 5, by C. MacDonald, engr. Westchester Co., Court House, White Plains, curbing, sidewalks, rein.-con. and warrenite bitulithic or sheet asphalt on concrete paving Central Park Ave., Co. Rd. 99.

O., Shaker Heights (br. Cleveland)—May 7, by City, 20,000 sq.ft. 2½ in. stone sidewalks—relaying 20,000 sq.ft. sidewalks, 100 cu.yd. slag screenings. F. A. Pease Eng. Co., Terminal Tower, Cleveland, engrs.

Pa., Oil City—May 4, by C. S. Hetrick, city clk., City Hall, grading retaining wall, rein.-con. paving 5,923 sq.yd. North Main Street extension. $50,000. B. B. Weber, City Hall, engr.

Tex., Marshall—City rejected bids Apr. 14, concrete curbing, concrete guttering, grading, catch basins, manholes, alternate types paving 11,102 sq.yd. streets. Will readvertise. W. C. Albright, Marshall, engr. Noted Apr. 2.

Utah—May 6, by State Rd. Comn., Salt Lake City, oil processing 41 mi. State Hy., Juab, Millard, Beaver and Iron Counties. H. S. Kerr, state road engr.

West Virginia—May 5, by State Hy. Comn., Charleston, **(P. means Project)** surface treating 8.51 mi. Phillippi-Grafton-Junior-Randolph Rd., Projects 3184 and 3113 Barbour Co.—9.62 mi. Clarksburg-Westin Rd., Projects 3225-B and C Harrison Co.—14.8 mi. Clothier-Ethel Rd., Projects 3059, 3200 and 3262 Logan Co.—20.6 mi. Salt Sulphur-Peterson Rd., Projects 3045 and 3304 Monroe Co.—4.56 mi. Smithville-Calhoun Co. Line Rd., Projects 3266-D and 3342 Ritchie Co.—11.3 mi. Marrowbone-Bull Creek Rd., Projects 3118, 3188 and 3189 Wayne Co.—concrete surfacing 8.2 mi. Flatswood-Bulltown Rd., Projects 69 and 108 Braxton Co.—2.18 mi. Fairmont-Mannington Rd., P. 18—A Marion Co.—cold tar surface treating 10.48 mi. Gauley Bridge-Swiss Rd., Projects 3358 and 3181 Fayette and Nicholas Counties—grading, drainage structures, 6.62 mi. Uffington-Smithtown Rd., P. 3478 Monongalia Co.—grading, drainage structures, shale surfacing 6.19 mi. P. 3499 Morgan Co.—123,000 lin.ft. wire rope guard rail between Millstone and St. Marys, State Route 16, Calhoun, Ritchie and Pleasants Counties—82,000 lin.ft. wire rope guard rail between Cabell Co. line and Winfield, State Routes 5 and 17, Mason and Putnam Counties—Conway Bridge 1236, steel deck superstructure, incl. one 175 ft., one 82 ft., one 50 ft. and two 40 ft. spans, P. 180-B Marion Co. G. R. White, secy.

Wisconsin—May 5, by State Hy. Comn. and Hy. Coms. Douglas, Polk, Barron and Bayfield Counties, Superior, grading 8.37 mi. Brule-Iron River Rd., U. S. Hy. 2, F.A.P. 375-G, Douglas and Bayfield Counties—crushed graveling 8,800 cu.yd. Luck-Cumberland Rd., S.T.H. 48, S.A.P. 8411, Polk and Barron Counties—concrete paving 3,471 sq.yd. New U. S. Hy. 53 and U. S. Hy. 2, Douglas Co.

Wisconsin—May 8, by State Hy. Comn. and Hy. Coms. Jefferson and Dodge Counties, Madison, asphaltic concrete or bituminous paving 1.5 mi. Johnson-Creek-Watertown Rd., S.T.H. 26, S.A.P. 1361, Jefferson Co.; 0.8 mi. U. S. Hy. 41, at Lomira, Dodge Co.

Wis., Superior — May 5, by C. Hanson, co. engr. Douglas Co., Court House, grading, graveling 8 mi. road. $85,000.

Newfoundland, St. John—May 20, by City, J. J. Mahoney, clk., concrete walks, curbing, guttering, asphalt paving 30,500 sq.yd. Wynne-Roberts, Son & McLean, Metropolitan Bldg., Toronto, Ont., consult. engrs.

Ont., Forest Hill—May 1, by L. V. Archer, village clk., concrete curbing, guttering asphalt or bitulithic on concrete paving 10 streets. $50,000. James, Proctor & Redfern, 36 Toronto St., Toronto, engrs.

Ont., Ottawa—See "Contracts Awarded."

Ont., Owen Sound—See "Contracts Awarded."

Ont., Toronto—May 2, by H. C. Rose, 57 Adelaide St. E., engr., concrete or mixed macadam paving 5 mi. Malvern Rd. easterly—penetration macadam paving 1¼ mi. Aurora easterly—waterbound macadam paving 2 mi. Mount Albert Rd. westerly — surface treating 6½ mi. county roads—grading roads in Markham Twp., for Toronto & York Roads Comn., 57 Adelaide St. $175,000.

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, grading, sub-grade stablizer on 10 mi. Florence-Tucson Hy., Pinal Co., to Hodgman & MacVicar, 714 Plymouth Bldg., Pasadena, Calif., $64,850. Noted Apr. 2.

California—State Hy. Comn., Sacramento, grading, concrete paving 0.6 mi. Alameda Co., to Jones & King, 214 East 14th St., Hayward, $34,595—crushed gravel or stone surfacing 25.3 mi. Plumas and Lassen Counties, to I. L. Ryder, 305 Alamaden Ave., San Jose, $96,533—grading, drainage structures 7.3 mi. Los Angeles Co., to W. F. Peck Co., 1120 North Las Palmas Ave., Los Angeles, $422,221. Grand total $553,349. Noted Apr. 2.

California—C. H. Purcell, engr., State Hy. Comn., Sacramento, crushed rock surfacing 6.6 mi. Rancho San Mateo-Half Moon Bay Rd., San Mateo Co., to H. E. Casey Co., San Mateo, $30,225.

California — C. H. Purcell, engr. State Hy. Dpt., Sacramento, grading 36 ft. wide, concrete paving 20 ft. wide 3.7 mi. road between Wigmore and Los Alamos, Santa Barbara Co., to Basich Bros. Constr. Co., Torrence, $118,066. Noted Mar. 26.

Calif., Los Angeles—Bd. P. Wks., City Hall, asphaltic concrete paving Centre St. between Bellflower and Artesia Sts., to Los Angeles Paving Co., 3200 East Vernon Ave., $37,465.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, sidewalks, sewers, 8 in. concrete paving 460,000 sq.ft. Flower St., to J. Papac, 726 North Hill St., $189,150.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, sidewalks, concrete paving San Marco Dr. and Lorenzo Dr. Impvt. Dist., to A. Nichols, California Bldg., Los Angeles, $31,950. Noted Dec. 25.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, 9-7-9 in. concrete paving 150,000 sq.ft. Atlantic Ave., to J. L. McClain, 3452 Slauson Ave., $40,825.

Calif., Santa Maria—City Council, curbing, grading, sidewalks, 4 in. asphaltic concrete surfacing 152,000 sq.ft. East Cook St., Cypress Ave., et al, to Santa Maria Constr. Co., Santa Maria, $26,350.

D. C., Wash.—District Comrs., District Bldg., concrete curbing, guttering, to Highways Eng. Co., 7th and T Sts. N. E., $132,856—asphalt paving, to Corson & Gruman, 33rd and K Sts. N. W., $207,851—widening, repaving, to Union Paving Co., Broad and Stiles Sts., Phila., Pa., $151,167—concrete roadways, to P. T. McDermott Co., 1014 Wisconsin Ave. N. W., $202,323—roadway, to W. P. McDonald Constr. Co., 381 4th Ave., $114,965. Grand total $809,171. Noted Mar. 5.

Idaho—A. Harbour, comr. P. Wks., Boise, grading, drainage structures, crushed gravel surfacing 7.417 mi. road in Lincoln and Jerome Counties, to Idaho Contg. Co., Boise, $82,375 est. $85,386; 13.077 mi. Cassia and Minidoka Counties, to Olof Nelson, Logan, Utah, $113,255 est. $146,318. Noted Apr. 2.

Idaho — State Dpt. P. Wks., Bureau Hys., Boise, grading, drainage structures, crushed rock surfacing 3.341 mi. Palouse Hy. between Seeters and Mud Bay, Federal Aid Project 101-E, Kootenai Co., to D. A. Sullivan & Co., Coeur d'Alene, $39,637—Rock Creek and Fall Creek Bridges on Old Oregon Trail, Federal Aid Project 109-C, Power Co., to D. J. Cavanaugh, Twin Falls, $16,949.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 47,573 sq.yd. Rd. 61, Federal Aid Project 121, Pike and Knox Counties, to Premier Constr. Co., Lemcke Bldg., Indianapolis, $69,970. Est. $84,378. Noted Feb. 12.

Ind., Princeton—Gibson Co., gravel surfacing J. Loveless Rd., to E. C. Wright, Greensburg, $21,800 — William Clift Rd., to G. Soller, Princeton $16,242—Hugh Smith Rd., to W. H. Lefler, Francisco, $6,882. Grand total $44,924. Noted Mar. 19.

Ind., Warsaw—Kosciusko Co., concrete surfacing 2.6 mi. Herbert Robinson Rd., to E. A. Gast, Warsaw, $37,767. Est. $43,873. Noted Mar. 19.

Iowa — State Hy. Comn., Ames, grading, drainage structures, paving 10.995 mi. road in Howard Co., to F. Carlson Co., Decorah, $248,637; 0.137 mi. Guthrie Co., to A. Melberg, Cedar Rapids, $4,027. Noted Apr. 9.

Ia., Marshalltown—Bd. Comrs. Marshall Co., gravel surfacing 12.5 mi. secondary roads, to McDougal Constr. Co., Marshalltown, at $0.641 per cu.yd. Noted Mar. 19.

Ia., Montezuma—Poweshiek Co., gravel surfacing secondary road system, to McDougall Constr. Co., Sioux City, $74,656. Noted Apr. 2.

Ia., Northwood—Worth Co., grading 17.4 mi. local roads, to M. R. McGuire, Algona, $9,965; 7 mi. trunk roads, to Kryson & Crener, Calmar, $14,316. Noted Mar. 19.

Kansas — State Hy. Comn., Court House, Columbus, concrete surfacing 7.074 mi. Kansas Project 96, Federal Aid Project 355-C, Cherokee Co., 20 ft., to Independent Constr. Co., Pittsburg, $137,770.

Kansas—State Hy. Comn., Court House, Hays, grading, culverts, concrete surfacing 9.582 mi. U.S. Rd. 408, Federal Aid Project 301-A, 20 ft., Ellis Co., to H. J. Taylor Constr. Co., Salina, $275,767.

Kansas—State Hy. Comn., Court House, Paola, grading, culverts, concrete surfacing 8.299 mi. Projects K17 and K-16, Federal Aid Project 293-C, Miami Co., 20 ft., to Geiger & Rutherford, Leavenworth, $153,314. Noted Mar. 19

Kansas—State Hy. Comn., Court House, Abilene, grading, culverts 5.446 mi. U. S. Rd. 83, Federal Aid Project 343-B, Norton Co., to Yancey Constr. Co., Abilene, $28,791. This corrects report in Apr. 16 issue.

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Streets and Roads (Continued)

Kentucky—State Hy. Dpt., Frankfort, rock asphalt on concrete surfacing 0.106 mi. roads in Boyd Co., to Hunt-Forbes Constr. Co., Ashland, $6,815—light tar and asphalt cut back on waterbound macadam surfacing 10.845 mi. Lincoln Co., to Stone Constr. Co., 452 South Pear St., Columbus, O., $138,815 — grading, drainage structures, using 1st class pipe 6.184 mi. Livingston Co., and bridge, approaches over east fork Clarks River, Calloway Co., to R. F. Pryor & Co., Mayfield, $51,549 and $23,975 respectively. Grand total $281,245. Noted Mar. 19.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 0.4 mi. Contr. Ho-82-38, Howard Co., to Christhilf & Ensey, 1625 Ridgley St., Baltimore, $19,837. Noted Apr. 2.

Md., Baltimore — Bd. Awards, vitr. brick paving 1,100 sq.yd. and granite block paving 2,750 sq.yd. streets listed in Contr. 588, to Westport Brick Co., Westport, $10,300. Noted Mar. 12.

Md., Baltimore—Bd. Awards, furnishing, delivering, applying bituminous materials, to Badger Meter Co., 841 30th St., Milwaukee, Wis., $23,005—penetration materials, to Mexican Petroleum Corp., Real Estate Bldg., Phila., Pa., $7,464—penetration materials, to E. P. Pendleton, 16 South Calverton Rd., $5,000—cold tar patch, to Barrett Co., 36th St. and Grays Ferry Ave., Phila., Pa., $6,240. Grand total $41,709.

Md., Baltimore—Bd. Awards, sheet asphalt paving 8,650 sq.yd. Contr. 593, to Amer. Paving & Contg. Co., Montebello Ave., $34,409. Noted Apr. 2.

Massachusetts — Dpt. P. Wks., bituminous macadam paving and 7 rein.-con. bridges, 29,257 ft. hy. Becket, to Bertolini Bros., 68 Admiral St., New Haven, Conn., $327,772—rein.-con. paving, concrete, steel bridge on 24,721 ft. hy. Framingham and Southboro, to B. Perini & Sons, Ashland, $744,374. Noted Apr. 2.

Mass., Attleboro—J. O. Taber, supt. P. Wks., penetration macadam paving, waterlines, drains, North Main St., day labor. $87,000.

Mass., Newburyport — Street Dpt., macadam repairs various streets, separate contracts. $150,000.

Mass., Winthrop — Town, Bd. Selectmen, macadam surfacing, to Reynolds Bros., 179 Summer St., Boston; edgestones, to S. Connolly, 47 Draper St., Dorchester; granolithic sidewalks, to F. J. McQueeney, 9 Atlantic St., Winthrop. Est. $25,000.

Michigan—H. C. Fleming, Watson Bldg., Grand Rapids, resident engr., grading, drainage structures 6.359 mi. MO61-27 Contr. 1, Muskegon Co., to Closser Bros., 11624 Winthrop Ave., Detroit, for State Hy. Comn., Lansing. $102,852 incl. cement. Awarded in March. Noted Feb. 5.

Mich., Detroit—Dpt. P. Wks., grading, stone curbing, 3½ in. sheet asphalt on 8 in. concrete paving 9,165 sq.yd. Biltmore Ave. from Fenkell St. to Midland Ave. and Roselawn Ave. from Margareta to Seven Mile Rd., to Cleveland Trinidad Paving Co., 715 Hammond Bldg., at $3.48 per sq.yd., total $32,075.

Mich., Flint — Genessee Co. Road Comn., shaping, drainage structures, concrete paving 12½ mi. roads, 20 ft., to M. W. Cochran Co., Dearborn, $264,584. Noted Mar. 26.

Nevada — Directors Dpt. Hys., Carson City, furnishing, applying mixing oil on 12.62 mi. California-Nevada State Line Rd., Routs 6, Sect. A, Clark Co., and reconstructing, grading, gravel surfacing, furnishing, mixing, oil surfacing 53.54 mi. road south of Elk Co. Line to Wendover, Route 24, Sects. A and B, Elko Co., to A. D. Drumm, Jr., Inc., Fallon, $21,966 and $159,791 respectively, est. $32,222 and $204,270 respectively—grading, gravel surfacing incidental structures 18.53 mi. road from Death to Wells, Route Sect. D2, D3, D1 and E2, Elko Co., to Gibbons & Reed, Continental Bank Bldg., Salt Lake City, Utah, $118,723 est. $180,053. Grand total $299,480.

Nevada—Directors State Hy. Dpt., Carson City, grading, drainage structures, asphaltic concrete surfacing 9.16 mi. Washoe Summit-Huffakers Rd., Washoe Co., to Clark & Henery Co., Reno, $215,279 est. $292,943; grading, drainage structures, gravel surfacing 27.2 mi. Winnemucca-West Stone House Rd., Humboldt Co., to J. N. Tedford, Fallon, $118,336 est. $141,708. Noted Apr. 2.

Nevada—State Hy. Dpt., Carson City, reconstructing road, Washoe Co., to Clark & Henry Constr. Co., 564 Market St., San Francisco, Calif., $215,279 road in Humboldt Co., to J..N. Tedford, Fallon, $118,337.

N. J., Long Branch—Bd. City Comrs., paving Morris and Chelsea Aves., to Jannerone Constr. Co., Passaic Ave., Belleville, $59,904. Noted Apr. 9.

N. J., New Brunswick—Bd. Freeholders Middlesex Co., concrete paving Oak Tree-Iselin Rd., to C. Sebolt, New Brunswick, $52,772. Noted Mar. 12.

N. J., Newton—Bd. Freeholders Sussex Co., Court House, furnishing, applying 250,000 gal. Grade B tar or U applied, to Dosch King Co., 30 Clinton St., Newark, $37,250.

N. J., Ogdensburg—Bd. Freeholders Sussex Co., Newton, curbing, grading, concrete paving 4,924 sq.yd. Edison Rd., to S. B. Martin, Sussex, $25,099. Noted Apr. 2.

N. J., Raritan — Middlesex Co., Hall of Records Bldg., New Brunswick, 8 in. concrete paving Iselin-Oak Tree Rd. to Conrad Sebolt, Bordentown Ave., South Amboy, $52,779. Est. $65,000. Noted Mar. 13.

N. J., Ridgefield—Bd. Boro Council, Boro Hall, concrete curbing, sidewalks Bergen Blvd., to Bergen Contg. Co., Inc., 365 Lawton Ave., Grantwood. Est. $25,000.

N. J., Trenton — Mercer Co., Court House, concrete paving 1.11 mi. Washington Crossing-Pennington Rd., to D. S. Tyson, Jefferson Ave., Morrisville, $45,000.

New York—A. W. Brandt, comr. Hys., Albany, concrete paving 7.52 mi. Hy. 8381, Amagansett-Montauk Point Rd., Part 2, Suffolk Co., to J. M. Murray, 42 East St., Rochester, $293,832. Est. $378,467.

New York—A. W. Brandt, comr. Hys., Albany, concrete paving 4.64 mi. Tompkins Co., to Tyne & Wiley, Inc., Binghamton, $169,641 est. $210,038—6.47 mi. Oneida and Lewis Counties, to J. McCormack, East Providence, R. I., $271,543 est. $329,212—6.25 mi. Orange Co., to Lane Constr. Corp., 37 Colony St., Meriden, Conn., $254,257 est. $338,450—6.13 mi. Madison Co., to J. F. Paddelford, Sherburne, $267,294 est. $328,752—5.23 mi. Dutchess Co., to Spoor-Lasher Co., Inc., Prospect St., Poughkeepsie, $200,969 est. $249,498—5.53 mi. Monroe and Livingston Counties, to H. W. Patterson, Ellicott Sq., Buffalo, $175,286 est. $218,018—3.61 mi. Oswego Co., to Provo Bros., Inc., 604 North Salina St., Syracuse, $138,102 est. $160,366—4.63 mi. Oswego Co., to Rochester Concrete Constr. Co., 466 Clinton Ave., Rochester, $179,641 est. $213,771—5.35 mi. Fulton Co., to D. Lewis Constr. Co., 420 Van Vranken Ave., Schenectady, $219,156 est. $279,919—3.57 mi. Ontario Co., and 5.99 mi. Ontario and Yates Counties, to Bolton, Suits, Bolton & Gibbs, Watkins Glen, $153,711 and $246,371 respectively, est. $194,279 and $304,344 respectively—4.26 mi. Ulster Co., and 4.07 mi. Ulster Co., to S. A. Scullen, Inc., Cohoes, $265,783 and $206,904 respectively, est. $358,779 and $275,155 respectively—5.44 mi. Columbia Co., and 8.83 mi. Albany and Greene Counties, to D. Arrigoni & Son, Middletown, Conn., $286,093 and $467,551 respectively, est. $400,777 and $583,588 respectively—3.77 mi. Orange Co., to Clinton Asphalt Co., Union City, N. J., $132,274 est. $177,269 — 3.92 mi. Schoharie Co., to Utica Constr. Co., Inc., 622 South St., Utica, $165,711 est. $214,348—1.62 mi. Nassau Co., to Westchester Constr. Co., Farmingdale, $57,754 est. $75,303—6.94 mi. Essex Co., to L. Mayersohn, Albany, $312,098 est. $386,749—0.62 mi. Ontario Co., to B. Behringer, Cheektowaga, $29,434 est. $32,885—7.08 mi. Livingston Co., to Canty-O'Neill & Candell, Inc., Ellicott Sq., Buffalo, $330,834 est. $416,415—2.86 mi. Nassau Co., to Good Roads Eng. & Constr. Co., Hempstead, $187,366 est. $235,942—4.34 mi. Westchester Co., to Immick Co., Inc., Meriden, Conn., $252,909 est. $341,955—9.4 mi. Allegany Co., and bituminous macadam paving 3.97 mi. Cattaraugus Co., to H. E. Bunce, Hornell, $381,206 and $175,614 respectively est. $478,251 and $225,553 respectively—7 mi. Essex Co., to Green Island Constr. Co., Green Island, $187,374 est. $234,701 — 8.7 mi. Chenango Co., to E. G. Delia Co., New Hartford, Conn., $329,319 est. $451,910—8.45 mi. Delaware Co., to C. W. Rose, Inc., Johnson City, $349,485 est. $388,654 — 0.83 mi. Chatauqua Co., to Porterfield-Binger Co., Youngstown, O. ,$79,772 est. $101,652—0.13 mi. Niagara Co., to J. Irwin Contg. Co., Lockport, $12,075 est. $16,551—7.05 mi. Delaware and Schoharie Counties, to C. C. Donohue, Inc., Kingston, $241,777 est. $287,382 — graveling 1.11 mi. Westchester Co., to A. Gregorio & Co., 227 Barry Ave., Mamaroneck, $77,735 est. $139,885—12.23 mi. Clinton Co., to H. W. Golden & Son, Inc., Troy, $198,711 est. $284,816—grading, structures, Nassau Co., to Munroe & Westcott, North Attleboro, Mass., $135,054 est. $195,966 — concrete and bituminous macadam paving 5.52 mi. Onondaga and Madison Counties, to Syracuse Paving Co., Syracuse, $274,281 est. $367,471—5.99 mi. Chemung Co., to J. F. Morgan, Olean, $287,058 est. $373,755. Grand total $7,700,143. Noted Mar. 5 and 19.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to D. J. McCoy Asphalt Co., Avenue U and East 57th St., asphalt paving Bay Ave. $4,188; East 18th St. $15,746; Elmwood Ave. $7,042; Kings Highway $1,966; Lenox Rd. $3,100; President St. $17,760; Prospect Pl. $8,708; 19th Ave. $14,912—to B. Turecamo, New Cropsey Lane, Terrace Pl. $6,290; 77th St. $28,824—to Grimm Contg. Co., 179 McKinley St., grading Cleveland Ave. $1,795—to B. C. Vitanza, 710 Avenue W, flagging Hubbard St. $1,884—to Guimont Contg. Co., 1218 Locust Ave., granite block paving Rock St. $10,356. Grand total $122,581. Noted Apr. 2.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to Lenxe & Hesse, 9020 247th St., Bellerose, granite block paving 44th Dr., $7,634—to L. Collins & Son, 147th St., Whitestone, regulating 21st Ave., $1,024; Ash Ave., $973—to Fox Reynolds Co., 81 East 125th St., New York, Pierce Ave., $6,184—to P. K. Kelly Contg. Co., 69-34 51st Ave., Winfield, Stanhope St., $1,480—to Meehan Paving Constr. Co., Laurel Hill Blvd., asphalt paving 87th St. $10,373; 70th St. $4,283; 65th St. $13,003; 84th St. $9,982—to Pomonok Asphalt Paving Co., 1246 Grand Ave., Brooklyn, Gates Ave., $4,780—to Borough Asphalt Paving Co., 1301 Metropolitan Ave., Brooklyn, 115th Ave., $2,803—to Welsh Bros. Contg. Co., 35 Purvis St., Leverich St., $9,283—to W. P. MacDonald, 7 Lawrence St., Flushing, Queens Ave., $24,089. Grand total $95,891. Noted Apr. 2.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., repaving 182nd St., to L. DiMinna, 4778 3rd Ave., $67,467—Lurting Ave., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $9,717—Olinville Ave., to Bronx Asphalt Co., Zerega Ave. and Westchester Creek, $36,993—West 172nd St. and granite block paving East 163rd St., to Meehan Paving Co., 90 West St., $24,394 and $144,329 respectively—sewer in Harper Ave., to A. Musumecci, 277 East 146th St., $9,896. Grand total $292,796. Noted Apr. 9.

North Carolina—State Hy. Comn., Raleigh, to R. G. Lassiter & Co., Raleigh, grading, clearing, drainage structures, concrete paving 10.46 mi. Pasquotank Co., $207,087; grading, drainage structures, concrete paving 7.07 mi. Rowan Co., $131,662; 13.25 mi. Lenoir Co., $73,066—to Noll Constr. Co., Charlotte, 8.79 mi. Rowan Co., $146,990—to F. J. McGuire, Norfolk, Va., 7.49 mi. Craven Co., $134,582—to Gregory-Chandler Co., Inc. Virgilina, Va., clearing, grubbing, grading, drainage structures, 5.97 mi. Madison Co., $78,352—to Blythe Bros. Co., Charlotte, grading, drainage structures, sand asphalt paving 15.08 mi. Onslow Co., $134,640—to Wm. F. Bowe, Jr., Augusta, Ga., grading, drainage structures, rein.-con. structures, plain concrete paving 6.52 mi. Anson Co., $135,338—to Beal Bros., Bear Creek, clearing, grading, drainage structures, top-soiling 7.39 mi. Chatham Co., $47,883—to Hanford Bros., Burlington, 5.46 mi. Robeson Co., $33,970. Grand total $1,123,570.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage structures 11.019 mi. Pushmataha Co., to Blackmore Constr. Co., Ardmore, $77,356 est. $80,000—10.787 mi. Harmon Co., to Kadane Constr. Co., Frederick, $71,475 est. $75,000—3.521 mi. Jackson Co., to Asplund Constr. Co., Enid, $83,960 est. $90,000—15.64 mi. Harper Co., to Humphrey & Thompson, Securities Bldg., Omaha, Neb., $65,696 est. $75,000. Grand total $298,487.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage structures 8.56 mi. State Hy. 45, Alfalfa Co., to L. Schultz, Alva., $21,581 est. $25,000—9.96 mi. U. S. Hy. 62, Muskogee Co., to Moran & Buckner, Muskogee, $51,458 est. $55,000—4.51 mi. U. S. Hy. 64, Woods Co., to Crushed Rock Contg. Co., Durand, $44,179 est. $50,000. Grand total $117,218.

Oregon—State Hy. Dpt., Salem, regrading, surfacing Oregon-California Hy., Umatilla Co., to H. E. Schmeer, 685 East 12th St. N., Portland, $100,686—bituminous macadam paving 33.5 mi. Old Oregon Trail, Umatilla and Union Counties, 20 ft., to J. C. Compton, McMinnville, $143,892—8.1 mi. Gales Creek, Lane Co., 20 ft., to Harmon & Tuttle, Eugene, $112,551. Grand total $357,129. Noted Apr. 2.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, drainage structures, bituminous surface treated waterbound macadam surfacing 60,411 sq.yd. road in Clearfield Co. and 41,966 sq.yd. Cambria Co., to N. B. Putnam Co., 2301 Fairfield St., Ft. Wayne, Ind., $120,575 and $136,740 respectively—13,910 sq.yd. Union Co., to Smith Fenster Machine Co., Allentown, $26,275—51,231 sq.yd. Huntington Co. and 89,580 sq.yd. Bucks Co., to York Eng. & Constr. Co., York, $108,881 and $190,148 respectively—56,564 sq.yd. Susquehanna Co., to Sweeney Bros., Scranton, $142,605—18,176 sq.yd. Clarion Co., to Minns Bros., Dubois, $39,150. Grand total $764,374. Noted Apr. 9.

Tex., Corpus Christi—G. Blackburn, city engr., 1½ in. hot mix rock asphalt on 5 in. rein.-con. surfacing Tiger St. from Belden to Resaca Sts., to Brown & Root, Corpus Christi, $23,173. Est. $25,000. Noted Mar. 12.

Tex., Turkey—City c/o V. Fuston, secy., concrete curbing, concrete guttering, 6 in. concrete paving 10,262 sq.yd., to Panhandle Constr. Co., Lubbock, $31,598. Noted Mar. 19.

Utah — State Rd. Comn., Salt Lake City, gravel surfacing 13.4 mi. Salina-Venice Hy., Sevier Co., to W. W. Clyde & J. W. Whiting, Springville, $13,308. Est. $16,886.

Utah—State Rd. Comn., Salt Lake City, grading, surfacing 7.275 mi. State Hy., San Pete Co., to W. W. Clyde & J. W. Whitning Springville, $45,381 est. $53,872; grading, bridging, surfacing 4.27 mi. San Pete Co., to Young & Ogden, Richfield, $39,708 est. $47,110. Noted Mar. 30.

Virginia—State Hy. Comn., Richmond, grading, drainage structures, wire rope guard rail, one course macadam surfacing 1.63 mi. road in Washington Co., to East Tennessee Limestone Quarries Co., Johnson City, Tenn., $34,546—0.687 mi. Giles Co., to G. T. Franklin, Bassett, $12,054—clearing, grubbing, grading, drainage structures, wire rope guard rail, surface treating 7.315 mi. Lancaster Co., to J. M. Cowherd, Gordonsville, $43,413—clearing, grubbing, grading, drainage structures, wire rope guard rail, concrete surfacing 2.329 mi. Hanover Co., to Spottsylvania Constr. Co., Inc., Highland Springs, $30,906—four 30 ft. rein.-con. beam span bridge over Cunningham Creek, Fluvanna Co., and 20 ft. rein.-con. arch bridge over Austins Run, Buckingham Co., to Cobb & Homewood, Inc., Chapel Hill, $8,805 and $5,275 respectively. Grand total $134,999. Noted Apr. 9.

Va., Richmond—Bd. P. Wks., R. K. Compton, dir., smooth paving, curbing, guttering to C. M. Hanley, 23 South Beach St., $30,440. Noted Mar. 19.

Washington—S. J. Humes, dir. Hys., Olmypia, grading 5.937 mi. State Rd. 1, Oak Rd. to Beverly Park, Snohomish Co., to Fiorito Bros., 3950 6th Ave. N. W., Seattle, $134,195. Noted Mar. 26.

Streets and Roads (Continued)

Wash., Everett—Bd. City Comrs. removing wooden blocks, concrete paving 8 blocks Colby Ave., to Ervig & Harris, Everett, $54,328.

West Virginia—State Hy. Comn., Charleston, concrete surfacing 2.55 mi. Fayette Co., to Hatfield Constr. Co., Huntington, $43,764—Grant Co., to S. G. Polino, Fairmont, $53,300—0.32 mi. Jefferson Co., to H. C. Brooks Co., Martinsburg, $12,819—grading, asphalt surfacing 4.7 mi. Greenbrier Co., to C. V. Rector & Sons, Muncie, Ind., $77,316—grading, drainage structures, shale surfacing 11 mi. Hardy Co., to Polono Constr. Co., Fairmont, $214,559—3.8 mi. Hardy Co., to Phillips & Withers, Buckhannon, $42,664—cold tar surface treating Mason and McDowell Counties, to Southern Oil & Tar Co., Louisville, Ky., $16,240—gravel surfacing 5.58 mi. Putnam Co., to Bartlett Constr. Co., Clarksville, $11,706—grading, concrete surfacing 0.88 mi. Mason Co., to J. D. Greenway, Huntington, $31,672—traffic bound top surfacing 5.96 mi. Mingo Co., to Mirable & DeFuria, Welch, $17,000—100,000 lin.ft. wire rope guard rail, Grant, Hampshire and Mineral Counties, and 175,000 lin.ft. wire rope guard rail, Preston, Tucker and Randolph Counties, to A. W. Burns Constr. Co., 424 Woodland Ave., Columbus O., $27,000 and $46,375 respectively—bridges Upshur Co., to Haynes Bros., Russellville, $10,125—Uushur Co., to Dewey Bros., Goldsboro, N. C., $13,814. Grand total $618,354. Noted Apr. 9.

Wisconsin—State Hy. Comn. and Hy. Coms. Brown, Calumet, Outagamie, Shawano and Kewaunee Counties, Green Bay, grading, bridging 8.553 mi. Calumet and Brown Counties, to R. B. Vickery & Co., Suamico, $78,396—grading, concrete paving 126,923 sq.yd. Brown and Kewaunee Counties, to Schuster Constr. Co., Denmark, $303,139—106,666 sq.yd. Shawano Co., to W. M. Conway, 2105 Jefferson St., Madison, $241,742. Grand total $623,277. Noted Apr. 9.

Wisconsin—State Hy. Comn. and Hy. Coms. Chippewa, Dunn and Taylor Counties, Madison, 20 ft. concrete paving 12.99 mi. Medford-Prentice Rd., to McKenzie & Kileen, Superior, $325,376; Johnson and Vojrt Bridges, to E. Blank, Cochrane, $3,451 and $5,565 respectively. Grand total $334,483. Noted Apr. 9.

Wisconsin—State Hy. Comn. and **Hy. Com.** Fond du Lac Co., Fond du Lac, grading, drainage 2 mi. Byron-Empire Rd., County Trunk K, S.P. 2037, and 5.6 mi. Town Line Rd., County Trunk W, S.P. 2013, to Yager & Braun, Eden, $10,171 and $17,209 respectively—4.01 mi. Waupaun-West Rosendale Rd., S.P. 2014, to F. Mashuda, 913 48th Ave., Milwaukee, $17,762—4.03 mi. Ridge Rd., Co. Trunk 1, S.P. 2039, and 3.84 mi. Van Dyne-West Rd., County Trunk P, S.P. 2038, to J. A. Zielke, Oakfield, $6,205 and $8,713 respectively—1.82 mi. Ashford Rd., C.T.H. "BB", to Gooderle & Raemisch, Dane, $8,305. Grand total $68,365.

Wisconsin—State Hy. Comn. and Hy. Coms. Lincoln and Price Counties, Rhinelander, grading, concrete paving 84,099 sq.yd. Merrill-Woodruff Rd. Sect. 2, to Universal Eng. Co., Medford, $162,277—120,935 sq.yd. same road Sect. 1, to Streu Constr. Co., Two Rivers, $236,084—128,818 sq.yd. Marshfield-Prentice Rd., to F. F. Mengel Co., Wisconsin Rapids, $264,888. Grand total $663,249. Noted Apr. 9.

Wis., Milwaukee—Dpt. P. Wks., to Gumz & Switalski, 831 13th Ave., paving alley between Broadley and East Howard Sts., $4,236; alley between North 56th and 57th Sts. $1,568; alley between South 33rd and 34th Sts. $5,016; South Clermont Ave. $1,332; West Chambers St. $4,412; West Hadley St. $1,791—to Parkinson Constr. Co., 3513 Highland Blvd., South 61st St. $1,849—to Bleck Constr. Co., 930 38th St., North 23rd St. $26,231; North 69th St. $15,628; West Keefe Ave. $48,436—to Bodemann Constr. Co., 691 48th St., North 53rd St. $16,617—to Czerwinski Constr. Co., West 16th and Morgan Ave. West Nash St. $4,973—to E. Rodtke, 1405 13th St., West Fairmont Ave. $1,087. Grand total $133,173. Noted Mar. 31 Daily.

Wis., Milwaukee — W. J. Cary, clk. Milwaukee Co., to McGucken & Vander Hayden, 192 4th St., Layton Ave. 1 overhead approaches, $10,702; Rawson Ave. 1 overhead approaches, $7,304; Howell Rd. 2 overhead approaches, $30,032; Silver Springs Rd. overhead approaches, $8,012; South Pine Ave. 1 overhead approaches, $32,072; South Bush St. 1 overhead approaches, $32,522—to Marchese Bros., 1127 South 1st St., Good Hope Rd. 2 overhead approaches, $54,892. Grand total $175,536.

Ont., Ottawa—Carleton Co., maintenance of roads, incl. grading, graveling, drainage culverts, etc., day labor, $30,000; plans new roads, $65,000. T. H. Byrne, 71½ Sparks St., engr.

Ont., Owen Sound—Grey Co., R. C. McKnight, engr., County Bldgs., road program for 1931, incl. maintenance, repairs, grading, drainage structures, etc., day labor, $55,000; new construction $120,000, and suburban roads $40,000, to be built mostly by tender.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Calif., Long Beach—Dredging 400 000 cu.yd. in Outer Harbor. R. G. McGlone, city harbor engr.

Mass., Chatham—Town and Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, sea wall, Chatham Bluff. $30,000. A. W. Dean, Dpt. P. Wks., State House, Boston, engr.

Tex., Fort Worth—Tarrant Co., c/o W. E. Yancey, rein.-con. retaining wall on Northwest Hy. from Northwest 12th to 18th Sts. $37,000. W. Stevens, Ft. Worth, engr.

Tex., Galveston—City completed plans filling in 40 acres land, removing drainage ditch, clearing field, rebuilding fences, grading roads, treating 4 runways, $30,000; plans small steel hangars and shop building, $60,000. Beretta-Stiles Co., Inc., Natl. Bank of Commerce Bldg., San Antonio, consult. engrs. Noted Jan. 8.

Tex., Port Arthur—city, c/o J. W. O'Neal, mayor, preliminary plans steel sheet piling breakwater at city slip to protect pleasure craft moored in inlet. $75,000.

Canada—Federal Govt. Dominion of Canada, main estimates for fiscal year ending Mar. 31, 1932, as follows:

Dept. Railways and Canals—Canals; rebuilding St. Qurs Lock, $435,000; construction and betterments of Welland Ship Canal, $3,000,000 and improvements, $157,450; improvements, Welland, Ont. $60,300—elevator improvements, Port Colborne, Ont., $42,000; improvements to canal, Chambly , $55,500; improvements to canal, Trent, $166,400—

Dpt. P. Wks. — Harbor improvements, Toronto., Ont., $200,000; postal station in Notre-Dame de Grace, Montreal, Que., $145,000; postal terminal building, Montreal, Que., $500,000; combined public building and Canadian Natl. Ry. Terminal, Windsor, Ont., $100,000—Harbors and Rivers—in Novia Scotia, breakwater repairs, Dingnall (Aspy Bay), $14,000; Freeport, $11,500; Little Brook, $10,000; Margaretville, $10,000; wharf extension Mahagash, $10,000; wharf at North East Point, Cape Sable Island, $19,000—New Brunswick; harbor improvements, St. Andrews, $10,000; dredging, St. John River, $18,000—In Quebec—wharf repairs and improvements, Anse a Louise, $21,000, dredging Batiscan River, $12,000; wharf repairs, Clarke City, $22,000; wharf repairs and improvements, Havre St. Pierre, $28,000; dredging, Nicolet River, $14,000; whaf repairs, Rimouski, $16,500; wharf repairs, Riviere du Loup (en bas), $10,000—in Ontario—harbor improvements, Cobourg, $30,000; Collingwood, $150,000; Oshawa, $75,000; Port Hope, $27,000; Port Maitland, $22,000; dredging Key Harbor, $20,000; Little Cataraqui Bay, Kingston, $150,000; pier repair, Kingsville, $28,000; reconstructing wharf, Parry Sound, $25,000; dredging and pier repairs, Toronto, $36,600; repairs to harbor works, Port Colborne, $40,000—Manitoba; jettie repairs, Red River, $10,000; repairs, St. Andrew's Rapids, $29,500—British Columbia; wharf reconstruction, Argenta, $10,500; dredging in Maritime Provinces, $350,000; dredging in Ontario and Quebec, $350,000; dredging in Manitoba, Saskatchewan and Alberta, $50,000; dredging in British Columbia, $150,000—Telegraph & Telephone Lines; repairs and improvements, Cape Breton, N. S., $12,800—cable ship for lower St. Lawrence R. F. Maritime Province, $75,000; repairs and improvements, Saskatchewan and Alberta, $21,500—British Columbia, Northern Dist., $31,100; Vancouver Island Dist., $32,500—Yukon Telegraph system, $19,300.

Ont., Hamilton—Developing harbor front for industrial sites, incl. dredging, filling, constructing concrete docks. $1,500,000. W. L. McFaul, City Hall, engr.

BIDS ASKED

Calif., Stockton—City Council taking bids dredging 188,000 cu.yd. material from south side Stockton Channel in Boggs Tract.

Ill., Chicago—May 6, by South Park Comrs., 57th St. and Cottage Grove Ave., bulkhead to provide extension (southward) to northerly island of Lake Front Impvt. M. E. Connelly.

Miss., Marks—See "Dams."

N. Y., New York—May 4, by M. Cosgrove, comr. Docks, Pier "A," Battery Pl., dredging, depositing riprap, and back fill north Latting St. on easterly side Westchester Creek, Bronx Boro.

Tex., Eagle Pass—Maverick Co. Water Control & Impvt. Dist. 1 taking bids distribution system in connection with irrigation system (now under construction), involving 60,000 acres land, gravity. W. L. Rockwell, Eagle Pass, engr.

Ont., Collingwood—May 5, by N. DesJardines, secy., Dpt. P. Wks., Ottawa, dredging 42,000 cu.yd. hard packed or cemented boulders, 58,400 cu.yd. clay and gravel. $125,000.

CONTRACTS AWARDED

Ill., Chicago—Bd. Comrs. Lincoln Park, North Clark and Center Sts., dredging 450,000 cu.yd. Montrose Harbor, to Fitzsimons & Connell D. & D. Co., 10 South La Salle St., $144,000. Noted Mar. 26.

Massachusetts — Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, A. W. Dean, ch. engr., dredging 75,000 cu.yd. channel basin, Marshfield to Trimount Dredging Co., 10 State St., Boston, $31,898; 45,000 cu.yd. Lake Anthony, Oak Bluffs, and 20,000 cu.yd. Manchester Harbor, Manchester, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $18,920 and $11,220 respectively. Grand total $62,038. Noted Apr. 9.

Bond Elections

Coming Bond Elections

Waterworks, Mains, Pump, Tank, etc.—Fairfield, Calif., May 23, $42,500. A. M. Jensen, San Francisco, Engr.

Watermains, 12,000 ft. 6 in.—St. Helena, Calif., $18,000.

Dam, Reservoir, Pipe Lines, etc.—Santa Barbara, Calif., $2,100,000, V. H. Trace, Water Supt.

Sewers—Oakland, Calif., May 12, $1,300,000. W. N. Frickstad, City Engr.

Sewers—Palo Alto, Calif., $100,000.

Sewerage System, Disposal Plant—Las Vegas, N. M., $160,000.

Park, Bathing Beach, etc. — Oakland, Calif., May 12, $800,000.

Libraries, Museum, Exposition Buildings—Oakland, Calif., $1,550,000.

Auditorium—Venice, Calif., $200,000.

Bonds Voted

Waterworks—Weldon, Iowa, $15,000.

Waterworks — LeRoy, Kan., $36,000. E. T. Archer & Co., Kansas City, Mo., Engr.

Filtration Plant—Forsyth, Mont., $75,000. F. Palmer, City Engr.

Sewage Disposal Plant—Willmar, Minn., $25,000. H. Gunderson, Clk.

Sewerage System — Dumas, Tex., $70,000. N. McDade, Mayor.

School—San Marcos, Tex., $200,000.

Bonds Defeated

Waterworks—Fulton, Kan., $28,000.

Auditorium and Civic Center—Fresno, Calif., $2,000,000.

High School—Sebastopol, Calif., $275,000.

Fire Stations—Kansas City, Kan., $225,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Calif., Humboldt—JETTIES—U. S. Eng., repairing jetties in Humboldt Harbor and Bay. $58,000.

Calif., Sacramento—WEIR—U. S. Eng., concrete weir, with apron, abutment walls, near Moulton Landing on Sacramento River.

Calif., San Francisco—ROCK REMOVAL—U. S. Eng. removing 39,800 cu.yd. rock from San Francisco Bay.

Conn., Stamford—DREDGING—U. S. Eng. Providence, R. I., 72,000 cu.yd. in West Branch Channel. $25,000.

Idaho, Pocatello — POST OFFICE, etc. Treas. Dpt. at office Sup. Archt., plans by F. H. Paradice, Jr., Pocatello, extending U. S. Post Office and Court House.

Ill., Scott Field (Belleville P. O.) — AIR FIELD — Con. Q. M. sketches air field, incl officers quarters, barracks, club house, hospital post exchange, shops and hangars. $3,117,000.

Ind., Terre Haute—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by Miller & Yaeger, 819 Ohio St., post office, court house.

Ia., Dubuque — FEDERAL BUILDING and POST OFFICE — Treas. Dpt. at office Sup. Archt., 193 x 193 ft. federal building, post office, Locust and Bluff Sts. $675,000. Noted Nov. 20.

Me., Portland—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by J. H. Stevens, 477 Congress St., U. S. Post Office. Noted Dec. 25.

Mass., Camp Devons — MAGAZINE — Con. Q. M., concrete magazine.

Mass., Lynn—DREDGING—U. S. Eng., Boston, 700,000 cu.yd. in Lynn Harbor.

Mass., Waltham—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Wadsworth, Hubbard & Smith, 11 Beacon St., Boston, U. S. Post Office.

Mich., Grand Rapids—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by Robinson & Campau, 258 College St. S. E., Grand Rapids, extending, remodeling U. S. Post Office and Court House.

Miss., Jackson—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by Hull & Malvaney, Merchants Bank Bldg., post office, court house.

Mont., Babb-Piegan—INSPECTION STATION—Treas. Dpt. at office Sup. Archt., rejected bids Mar. 16, inspection station. Will readvertise. Noted Feb. 19.

N. J., Paterson—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Wentworth & Vreeland, Citizens Trust Bldg., Paterson, U. S. Post Office. Noted Apr. 16.

N. Y., New York—DREDGING—U. S. Eng., Whitehall Bldg., improving Bronx River providing channel 10 ft. in depth at mean low water, secured by dredging, extending from deep water in East River to head of navigation at East 177th St. and dredging Bronx River to restore portion channel below Westchester Ave. $15,000.

Pa., Phila.—DREDGING—U. S. Eng., 2,860,000 cu.yd. Schuylkill River between mouth and Passyunk Ave.

Tenn., Chattanooga—AIR COMPRESSORS—U. S. Eng., 4 portable air compressors.

Tenn., Nashville—MOVABLE CREST—U. S. Eng., steel parts movable crest for Dam 1, Cumberland River.

Tex., Brownsville—DREDGING—U. S. Eng., Galveston, and Brownsville Navigation Dist., survey, channel, turning basin. $5,500,000.

Federal Government (Continued)

BIDS ASKED

Arizona—ROAD—May 12, by Pub. Rds., 807 Sheldon Bldg., San Francisco, Calif., grading 12.975 mi. Fredonia-Grand Canyon Natl. Forest Hy., Coconino Co. C. H. Sweetser, dist. engr.

D. C., Wash.—ALTERING—May 14, at office D. Lynn, archt., Capitol, altering street facade, senate office building, C St.

Arkansas—LEVEE—May 6, by U. S. Eng., P. O. Box 667, Vicksburg, Miss., 65,000 cu.yd. earthwork in Farelly Lake Levee Dist., north bank Arkansas River.

Conn., Hartford—DREDGING—May 6, by U. S. Eng., Providence, R. I., 50,000 cu.yd. in Connecticut River, depth 12 ft. at mean low water; adv. E. N.-R. Apr. 30.

D. C., Wash.—BRIDGE—May 15, at office Director P. Buildings & Pub. Parks, National Capitol, Navy Bldg., rein.-con., stone faced bridge known as Waterside Dr. Overpass, containing comfort station, police lodge, storage room, Rock Creek and Potomac Parkway, east bank Rock Creek between Que St. and Massachusetts Ave. N. W.; adv. E. N.-R. Apr. 30.

D. C., Wash.—WAREHOUSE—May 26, by Con. Q. M., Army Medical Center, Q. M. Warehouse, Laundry, Bakery; adv. E. N.-R. Apr. 30.

Fla., Lakeland—POST OFFICE—May 14, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. $125,000.

Ga., Brunswick—DREDGING—May 4, by U. S. Eng., Savannah, 649,939 cu.yd. East River, Brunswick Harbor.

Ga., Fort Benning—BARRACKS—May 28, by Con. Q. M., Units E, F, G and H, Barracks 2; adv. E. N.-R. Apr. 30.

Idaho—ROAD—May 6, by Dpt. Agriculture, Pub. Rds., 403 Kiesel Bldg., Ogden, Utah, clearing, grubbing, grading 3.683 mi. North and South Hy., Natl. Forest Road Project 1-A, within Pend Oreille Natl. Forest, Boundary Co.; 7.487 mi. Ketchum-Clayton Natl. Forest Rd., Project 26-J, Challis Natl. Forest, Custer Co.

Ill., Kankakee—REMODELING, etc.—May 13, by Treas. Dpt., at office Sup. Archt., remodeling, enlarging U. S. Post Office; adv. E. N.-R. Apr. 30.

Ind., Fort Benjamin Harrison—HOSPITAL—May 15, at office Con. Q. M., hospital addition; adv. E. N.-R. Apr. 30. Noted Feb. 5.

Ind., Linton—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids about June 1, post office. Noted Jan. 29.

Ky., Louisville—POST OFFICE—June 1, by Treas. Dpt. at office Sup. Archt., superstructure U. S. Post Office. $2,985,000 appropriated. Noted Apr. 2.

Ky., Louisville—ROAD—May 28, by U. S. Eng., P. O. Box 72, concrete road on reservation, Lock and Dam 41, Ohio River; adv. E. N.-R. Apr. 30.

Mass., Boston—STONE—May 1, by U. S. Eng., 12,000 tons stone for riprapping and slope paving north and south banks for Cape Cod Canal.

Mich., Selfridge Field—QUARTERS—May 11, by Con. Q. M., 2 field officers' quarters and 10 non-commissioned officers' duplex quarters.

Minn., Noyes — INSPECTION STATION — May 25, by U. S. Eng., inspection station; adv. E. N.-R. Apr. 30.

Nevada—ROAD—May 7, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Calif., grading 9.62 mi. Sect. A, Midland Trail (Ely-Holt Creek) Natl. Forest Rd., White Pine Co.

N. J., Camden — DREDGING — May 5, by U. S. Eng., Phila., Pa., 295,000 cu.yd. in Delaware River between Kaign Point and Pine St.

N. J., Newark—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids about July, general contract post office and court house, Vroom Alley, Mulberry, Franklin and Washington Sts. $6,150,000. W. E. Lehman & G. O. Totten, 972 Broad St., archts. J. A. Wetmore, c/o owner, assoc. archt. Bids about May 1 clearing site. Noted Mar. 26.

N. M., Albuquerque—HOSPITAL—June 2, by Vet. Bu., Arlington Bldg., U. S. Veterans' Hospital; adv. E.N.-R. Apr. 30.

N. Y., Buffalo — BULKHEAD — May 7, by Superintendent Lighthouses, Buffalo, concrete pile bulkhead wall, and dredging Buffalo Lighthouse Depot.

N. Y., Buffalo—OIL STOREHOUSE—May 1, by U. S. Eng., oil storehouse, at Black Rock lock.

N. Y., New York—FEDERAL COURT—Treas. Dpt. at office Sup. Archt., bids about Jan. 1, general contract federal court house, Park Row, Duane, Pearl and Park Sts. $8,250,000. Cass Gilbert, 244 Madison Ave., archt. Noted Apr. 16.

N. Y., Plattsburg—KITCHENS, etc.—May 15, by Con. Q. M., Plattsburg Barracks, kitchens, messes; adv. E. N.-R. Apr. 30.

N. D., Pembina—CUSTOM HOUSE—May 25, by Treas. Dpt. at office Sup. Archt., U. S. Custom House.

Pa., Rochester—POST OFFICE—May 21, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Pa., Warren—POST OFFICE—May 20, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Jan. 29.

Texas—DREDGING—May 22, by U. S. Eng., Galveston, dredging 8,497,000 cu.yd. in Sabine River-Galveston Bay Sect., Louisiana and Texas Intracoastal Waterway, Jefferson and Chambers Counties. Noted Nov. 20.

Tex., Randolph Field—PAVING—May 22, by Con. Q. M., 200,000 sq.yd. asphalt on rolled gravel paving; adv. E. N.-R. Apr. 30.

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Tex., Texas City—DIKE—May 6, by U. S. Eng., Galveston, constructing rubble around 78 ft. dike, incl. 46,000 tons core stone and 57,200 tons cover stone; adv. E. N.-R. Apr. 30.

CONTRACTS AWARDED

California—U. S. Forest Serv., Ferry Bldg., San Francisco, grading culverts 6.6 mi. Santa Barbara Natl. Forest Hy., Monterey Co. to Owl Truck Co., Compton, $22,497.

D. C., Wash.—EXTENSIBLE BUILDING—Metropolitan Casualty Insurance Co., 1400 H St. N. W., designated Starrett Bros. & Eken, 101 Park Ave., New York, to complete extensible building, for Dpt. Agriculture. Est. $2,000,000. Noted July 10 under "Contracts Awarded."

Ill., Woodstock—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Anderson & Co., 37 West Van Buren St., Chicago, Ill., $62,500. Noted Mar. 19.

Ia., Mason City—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Anderson & Co., 1632 West 75th Pl., Chicago, Ill., $203,200 (420 days). Noted Mar. 19.

La., Shreveport—BARRACKS—Con. Q. M., enlisted men's barracks and 42 company officers' quarters, to Ashton Glassell Co., Shreveport, $419,350 and $462,457 respectively. Noted Mar. 12.

La., Shreveport—WAREHOUSES, etc.—Con. Q. M., Barksdale Field, quartermaster's warehouse, maintenance department warehouse, garage, to W. Murray Werner, Box 908, $72,622 (omitting refrigeration). Noted Mar. 26.

Mass., Provincetown—GUARD STATION—U. S. Coast Guard moving coast guard station, to J. A. Donnelly, 32 Wrightington Pl., Fall River, $6,995. Noted Apr. 7 Daily.

N. Y., Newburgh—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to A. M. Lundberg, Railway Exch. Bldg., St. Louis, Mo., $185,700. Noted Mar. 19.

N. Y., Staten Island—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Murch Bros. Railway Exch. Bldg., St. Louis, Mo., $265,000. Noted Apr. 19.

N. M., Clovis—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Holmboe Constr. Co., 426 West 2nd St., Oklahoma City, Okla., $88,500. Noted Mar. 12.

Pa., Carlisle—BARRACKS—Con. Q. M., barracks, to Hes Bros. Co., Inc., Grantley St. and King Mill Rd., York, $31,860.

S. D., Sioux Falls—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Post Office and Court House, to Murch Bros. Railway Exch. Bldg., St. Louis, $239,000. Noted Mar. 19.

Tenn., Memphis—DREDGES—U. S. Eng., 2 mammoth self-propelled dredges, to Dravo Contg. Co., Neville Island, Pittsburgh, Pa., $910,000. Noted Mar. 5.

Tex., Fort Sam Houston—QUARTERS—Con. Q. M., twelve non-commissioned officers' quarters, to R. McKee, 1916 Texas St., El Paso, $90,012. Noted Mar. 26.

Tex., Lubbock—POST OFFICE—Treas. Dept. at office Sup. Archt., post office, to W. MacDonald Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $221,290. Noted Mar. 12.

Va., Langley Field—QUARTERS—Con. Q. M., 16 double company officers' quarters, to H. M. Sobel Co., 510 Book Tower, Detroit, Mich., $353,620. Noted Feb. 26.

Va., Portsmouth — PIER — Yards & Docks, Navy Dpt., rein.-con. pier at Naval Hospital, to J. L. Smith, 416 Webster Ave., $25,897.

Vt., Rutland — POST OFFICE, etc. — Treas. Dpt. at office Sup. Archt., U. S. Post Office, Court House, to Castor & Castor Eng. & Constr. Co., Inc., 4205 New Utrecht Ave., Brooklyn, N. Y., $268,100. Noted Mar. 26.

Wash., Keyport—GRADING—Yards & Docks, Navy Dpt., grading warhead storage area at Pacific Coast Torpedo Station, to Cowan & Hubback, Seattle, $15,680.

Alaska—ROAD—Pub. Rds., Juneau, grading, grubbing, graveling 2.782 mi. Petersburg-Creek Hy., Juneau Co., to Hubbell & Waller Eng. Co., Alaska Bldg., Seattle, Wash., $49,778. Noted Apr. 2.

T. H., Pearl Harbor — DREDGING — Spec. 6299 — Yards & Docks, Navy Dpt., at Naval Ammunition Depot, West Loch, and at Naval Operating Base, Item 2, to Standard Dredging Co., Central Bldg., Los Angeles, Calif., $50,585 and $262,080 respectively; under Items 3, 4 and 5, to Hawaiian Dredging Co. Ltd., Honolulu, $769,225. Grand total $1,081,890. Noted Mar. 5.

FEDERAL POWER COMMISSION

Applications for License and Permits

Licenses

1150 — Puget Sound Power & Light Co., Stuart Bldg., Seattle, Wash., wants license transmission line partly on public land and partly within Wenatchee and Snoqualmie Natl. Forests in King and Chelan Counties.

1151—I. B. Mining Co., Butte, Mont., wants license constructed transmission line partly on public land in Beaverhead Co.

1152—California-Oregon Power Co., 58 Sutter St., San Francisco, Calif., wants license constructed transmission line on public land Douglas Co., Ore.

1153 — San Joaquin Light & Power Corp., Fresno, wants license constructed transmission line on public land and partly within Stanislaus and Sierra Natl. Forests, Mariposa Co.

1154 — California Pub. Serv. Co., Alturas, Calif., wants license transmission line partly on public land and partly within Modoc Natl. Forest, Modoc Co.

1155—City of Salem, Ore., wants preliminary permit power project on North Santiam River and tributaries, and Breitenbush River and tributaries with Santiam Natl. Forest, Linn and Marion Counties.

1156—Columbia River Power Co., Seattle, Wash., wants preliminary permit power project on Columbia River, near Cascade Locks, Ore., and Skamania Co., Wash.

1157 — Montana Power Co., Butte, wants license constructed transmission line partly on public lands and partly within Helena Natl. Forest, in Broadwater and Jefferson Counties.

1158—Buzzard Hill Mine, Inc., Happy Camp, Calif., wants license constructed power project on Buzzard Creek, within Klamath Natl. Forest, Siskiyou Co.

1159 — Pub. Serv. Co. of New Hampshire, Manchester, N. H., wants license transmission line on public lands White Mountain Natl. Forest, Grafton and Coos Counties.

1160—Pennsylvania Electric Co., Johnstown, Pa., wants license transmission line within Allegany Natl. Forest, Warren Co.

RAILWAYS

PROPOSED WORK

Oklahoma and New Mexico — Atchison, Topeka & Santa Fe R.R. Co., c/o W. W. Kelly, ch. engr. (Western Lines), Amarillo, Tex., 60 mi. railroad between Felt, Okla., and Gladstone, N. M.

Canada—Canadian Pacific Ry., J. M. R. Fairbairn, ch. engr., Montreal, Que., 7 branch lines, totaling 150 mi.

Canada—Federal Govt. Dominion of Canada, main estimate for fiscal year ending Mar. 31, 1932—Dpt. Railways and Canals—Hudson Bay Railway and terminals, construction and betterments, $6,000,000.

CONTRACTS AWARDED

Ohio—Baltimore & Ohio R.R., H. A. Lane, ch. engr., Baltimore, Md., 1 story, 75 x 360 ft., brick, steel, concrete freight house, Main St. and Riverbed Ave., in Cleveland, to Minton-Scobell Co., The Arcade. Est. $150,000.

SUBWAYS AND TUNNELS

BIDS ASKED

N. Y., Long Island City — May 8, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, installing tracks and contact rail, for Rapid Transit R.R., under Steinway St. near Northern Blvd. to Bway. and under Bway. terminating at point near Pettit Pl.

N. Y., New York—May 8, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., alterations in railroad structure to permit widening roadway of Lexington Ave. from 86th to 96th Sts., Agreement "JX."

N. Y., New York—May 19, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing Sect. 9, Route 101, Rapid Transit R.R., under and along 6th Ave. from West 43rd to West 53rd Sts.

GRADE CROSSINGS

PROPOSED WORK

Calif., Los Angeles—Bd. Comrs. Los Angeles Co., cities of Glendale and Burbank, and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., Victory Place Grade Separation. $75,000 or more.

N. J., Camden — West Jersey & Sea Shore R.R. Co., c/o Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., soon takes bids eliminating 14 grade crossings, 7th St. between Atlantic Ave. and Mickle St.

N. J., Clifton—Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, concrete, steel underpass, at East 9th St. $100,000.

New York—Bd. P. Wks., Hornell, rein.-con. bridge over Erie R.R. and Dyke Creek between Wellsville and Andover, Steuben Co. $98,000. E. C. Lawton, Hornell, dist. engr.

Tex., Waco—McLennan Co. soon takes bids 507 lin.ft. steel, concrete overpass, 24 ft. roadway, 2,000 ft. approaches, over Missouri, Kansas & Texas R.R., on Hy. 31, Federal Aid Project 605-B. $60,000. H. C. Porter, 323 Provident Bldg., resident engr.

CONTRACTS AWARDED

Ill., Chicago—Mundie & Jensen, archts., 29 South La Salle St., general contract remodeling stables into motor repairs shop and office, Sebor St. from Jefferson to Clinton Sts., to Ford & Phillips Co., 559 West Van Buren St., for Railway Express Agency, 58 East Washington St. Est. $400,000.

Minn., Minneapolis—Northern Pacific Ry. Co., B. Blume, ch. engr., and Great Northern Ry. Co., J. R. Davis, ch. engr., both Railroad Bldg., St. Paul, steel, concrete grade crossings, at Washington St., Lowry Ave. N.E., and 22nd Ave. N.E., to Industrial Contg. Co., 3050 4th Ave. S. Est. $250,000.

New York—Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, stone faced rein.-con. undercrossing at Bedford Rd. and 2 river bridges in Saw Mill River Parkway, to J. L. Sigretto, 100 Bway., New York, $111,430. Noted Apr. 2.

Ont., Scotia — Canadian Natl. Rys., T. T. Irving, ch. engr. (central region), New Union Sta., Toronto, abutments in connection with 2 overhead hy. crossings, 1 north and 1 east of here, to W. G. Campbell Eng. & Constr. Co., 142 Geoffrey St., Toronto. Est. $50,000.

DAMS

BIDS ASKED

Miss., Marks — May 7, by Panola Quitman Drainage Dist. at office L. B. Lamb, secy., dam across Tallahatchie River, 6 mi. southwest of Batesville.

Pa., Cannonsburg—See "Waterworks."

AIRPORTS

PROPOSED WORK

Mass., North Andover—City, M. H. Landers, mayor, City Hall, acquired 300 acre tract land on Merrimac River, for airport. To exceed $25,000. Engineer not selected.

CONTRACTS AWARDED

Miss., Laurel — Common Council, 1 and 2 story, 80 x 100 ft. hangar, 8,000 sq.ft. floor space, work shop and office, 2,000 sq.ft. floor space, rein.-con., brick, timber, also 1,400 sq.yd. 4 in. 1:2:4 concrete surfacing, to Bradley Bros. Constr. Co., Laurel, $12,900. Est. $13,000. Noted Apr. 2.

N. Y., Brooklyn—Dpt. Docks, Pier "A", Battery Pl., New York, preparing areas for parking motor veechicles at Municipal Airport (Floyd Bennett Field), to R. E. Orr Co., Grand Central Terminal, New York, $51,500. Noted Apr. 9.

Wash., Seattle—Comrs. King Co., 100 x 200 ft. steel, masonry hangar with 100 x 100 ft. concrete aprons, to Austin Co., Dexter Horton Bldg., $44,460. Noted Apr. 2.

GRAIN ELEVATORS

PROPOSED WORK

N. Y., Albany—GRAIN ELEVATOR—Albany Port Dist. Comm., P. G. Ten Eyck, chn., 1,500,000 bu. grain elevator. $1,850,000.

CONTRACTS AWARDED

Kan., Argentine (sta. Kansas City)—GRAIN ELEVATOR—Atchison, Topeka & Santa Fe R.R. Co., 80 East Jackson Blvd., Chicago, Ill., G. W. Harris, ch. engr., 4,000,000 bu., addition to Elevator A, to J. S. Metcalf & Co., 105 West Adams St., Chicago, Ill.

Okla., Texahoma — GRAIN ELEVATOR — Riffe Bros. Co., 250,000 bu. grain elevator, to Chalmers & Borton, 720 Pioneer Trust Bldg., Kansas City, Mo., $25,000.

POWER AND LIGHTING

PROPOSED WORK

Minn., St. Paul—City, ornamental electric lighting system in Pleasant Ave. between 4th and St. Clair Sts. and in St. Clair St. between Pleasant Ave. and Mississippi River Blvd. Est. $100,000. W. N. Carey, city engr.

Mo., Palmyra—Central States Gas & Utilities Co., Kansas City, natural gas distribution system in city and spur line from Mark. $50,000. Private plans.

Mo., St. Louis — City, Director Streets & Sewers, City Hall, preliminary plans 200 traffic signal lights, each to include 3 ton cone shaped base, topped by metal pole surmounted by amber colored flashing signal light and 2 fixed white lights. $65,000. C. Gonter, City Hall, engr.

Nev., Reno — City Comn. ornamental street lighting system, incl. underground system. $25,000 or more.

N. H., Manchester—Pub. Serv. Co. of New Hampshire, 1087 Elm St., high power electric transmission lines through White Mountain National Forest in Grafton and Coos Counties. To exceed $25,000. Private plans.

N. J., Hackensack—Hackensack Impvt. Comn., Municipal Bldg., preliminary plans setting back curb, laying fire and police alarm systems in widened area, constructing new curbs, granite block paving Main St. from Salem to Passaic Sts. $50,000. F Campbell, city engr.

BIDS ASKED

New York—May 11, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, electric lighting on Cross Co. Parkway from Yonkers to Hutchinson River Parkway, Eastchester. J. Downer, ch. engr.; adv. E. N.-R. Apr. 30.

N. Y., New York—May 5, by A. Goldman, comr. Plant & Structures, Municipal Bldg., new lighting system and lamp posts on Manhattan Bridge.

O., Cleveland—May 1, by City, furnishing cross arms, fibre conduit for municipal light plant division.

CONTRACTS AWARDED

Okla., Garber—C. N. Birdsall, city clk., natural gas distribution system, to W. G. Humphreys, 507 Security Bldg., Omaha, Neb., $23,650. Est. $27,000. Noted Apr. 2.

PARKS AND SPORTS

PROPOSED WORK

Mass., Danvers—Town, O. E. Jackson, chn. Building Com., plans by Little & Brown, 114 Federal St., Boston, concrete grandstand, grading in Danvers Public Park, also lockers underneath grandstand. $25,000.

Mass., Medford (br. Boston) — Commonwealth of Massachusetts, Metropolitan Dist. Comn., 20 Somerset St., Boston, bath house at Mystic Lake. $25,000 or more.

Mass., Norton—House of the Pines, c/o G. E. Cornish, gymnasium, Main St. $25,000. Engineer not selected.

N. Y., New York—Hollywood Pools, Inc., 101 Park Ave., plans by J. Brown, 101 Park Ave., 2 story, 30 x 240 ft. pool, showers, at 172nd St. and Jerome Ave. $70,000.

BIDS ASKED

Mass., Barnstable — Town, Bd. Selectmen, grandstand, grading, walks, driveways, curbings and bleacher building, high school grounds. $25,000.

N. J., Clifton—See "Contracts Awarded."

N. Y., White Plains — Saxonwoods Corp., Mamaroneck Ave., taking bids general contract swimming pool. Total exceeds $40,000. Tennis courts awarded, to H. H. Bassford, Heathcote Rd., Scarsdale.

O., Girard—May 2, by City, A. Montague, clk., 1 story, 120 x 130 ft., rein.-con. swimming pool. $25,000. B. Church, city engr.

CONTRACTS AWARDED

Conn., Darien — Tokeneke Club, H. Parker, Darien, 2 story, 80 x 115 ft., rein.-con. bathhouse, incl. septic tank, to W. G. Wood, Wilson Rd., Norwalk. Est. exceeds $25,000.

Conn., Middletown—Wesleyan University, A. Davis Eng. Dpt., 50 x 160 ft. indoor athletic field, to H. Wales Lines Co., 134 State St., Meriden. Est. $100,000. Noted Mar. 26.

Ind., Indianapolis—Indiana Agricultural Bd., general contract 122 x 508 ft., rein.-con., steel grand stand at Fair Grounds, to Service Constr. Co., Castle Hall Bldg., $155,500; plumbing, to R. I. Cotton, Indianapolis, $18,596; electric wiring, to C. L. Smith, 122 South Pennsylvania St., $8,400. Grand total $182,496. Est. $225,000.

Mass., Northampton—Middle Meadows Golf Club, W. H. Kent, 8 Ludington St., Springfield, general contract 1 story, 42 x 44 frame golf club, 18 hole golf course, to J. H. Dunn, 20 Fort St.; land work, filling, etc., to J. Parsons, 131 Bridge St. Est. $25,000.

N. J., Clifton—Elco Realty Co., Inc. (C. E. Cole), 253 Bellevue Ave., Upper Montclair, 75 x 165 ft., rein.-con., tile swimming pool, Grove St.; separate contracts. $25,000. A. E. Ramhurst, 516 Bloomfield Ave., Montclair, engr. Noted Mar. 26.

N. J., Trenton—State Bd. Educ., State House, athletic field incl. baseball diamond, running track, tennis courts at State College for Teachers, Pennington Rd., to E. Ranalli, 585 Roosevelt Ave. Est. $25,000. Noted Apr. 2.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, improving Playground 3, to Thomas McMillen Contg. Co., 26 Court St., $4,320; repaving walks in Botanic Gardens, to A. Ross, 293 Troy Ave., $3,400; constructing exit roads, Prospect Park, to Booth Constr. Co., Inc., 125 Court St., $18,158. Grand total $25,878. Noted Apr. 2.

N. Y., Long Island City—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, administration building, Forest Park, to G. Ramm, 11 West 42nd St., New York $12,700, plumbing, to S. Gallucci, Railroad Ave., Corona, $1,595, heating, to G. J. Tanzer, 327 West 43rd St. $3,385; walks in Bowne and Forest Parks, to Brugel Contg. Co., 1154 Cypress Ave., Ridgewood, $15,214 and $8,620 respectively. Grand total $41,514. Noted Apr. 2.

N. Y., New York—Cardo Bros. Molding Corp., amusement park, incl. dining pavilion, sand beach, bath houses, concessions, Westchester Bay near Castle Hill Park, to Cardo Bros. & Co., 3281 East Tremont Ave. Est. exceeds $150,000. Contractor taking bids on separate contracts.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., general contract constructing public bath house addition, to T. Thompson, Inc., 25 West 43rd St., $98,620; plumbing, to Walkaiser & Russel, $16,000. Noted Mar. 26.

N. Y., White Plains—See "Bids Asked."

HEATING AND VENTILATING

BIDS ASKED

N. Y., Creedmoor—May 20, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary work, kitchen equipment, for Kitchen and Dining Room Building 3 and Infirmary Building 4, at Creedmoor Div., Brooklyn State Hospital; adv. E. N.-R. Apr. 30.

N. Y., Pine Aire Station—May 20, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary work, elevators, kitchen equipment, at Dining Room and Kitchen Buildings 8 and 13, and Utility Dining Room and Kitchen Building 41, also refrigeration equipment, for cold storage plant, at Pilgrim State Hospital; adv. E. N.-R. Apr. 30.

N. Y., Wingdale—May 20, by Commissioner Dpt. Mental Hygiene, State Office Bldg., heating, saitary work, kitchen equipment, Reception Building 1, Harlem Valley State Hospital; adv. E. N.-R. Apr. 30.

CONTRACTS AWARDED

Conn., New Britain—City, J. M. Halloran, chn. building comr., heating in school, Bassett and Ellis Sts., to Byrnes Millward, 26 High St., Hartford, $19,587; plumbing, to I. Levine, 133 Smalley St., $9,639. Noted Apr. 23, under "**Schools.**"

Mass., Roxbury (sta. Boston) — Kendall, Taylor & Co., 209 Columbus Ave., Boston, archts., heating and plumbing in hospital addition, Parker Hill Ave., to J. F. Cabeen Co., 81 North St., Salem, for New England Baptist Hospital Corp., 85 Parker Hill Ave. Est. $25,000. Noted Apr. 23, under "Hospitals."

UNCLASSIFIED

PROPOSED WORK

Ind., Evansville—FIRE ALARM STATION, etc.—City fire alarm station, radio broadcasting apparatus, battery rooms, boilers. $30,000. C. L. Troutman, 410 Amer. Trust Bldg., engr.

N. J., Passaic—DOCK—Bd. City Comrs., City Hall, timber, concrete municipal dock, on Passaic River. $25,000 or more. **Maturity probably soon.**

N. Y., Goldenbridge — TOWNSITE — Halyan Realty Co., 185 Main St., White Plains, town site development, incl. streets, water mains, buildings. $150,000. **Maturity indefinite.**

O., Cincinnati—GREEN HOUSE—City plans by S. Meacham, 35 West 7th St., 1 story, brick, steel, rein.-con., plain found., Eden Park. $150,000.

O., Cleveland — LANDSCAPING, etc. — Bd. Educ., F. G. Hogen, dir., Cleveland, ground improvements, incl. landscaping, tree planting, seeding, sodding, driveway at new headquarters building. $75,000.

O., Cleveland—OIL STORAGE PLANT—Gulf Refining Co., Frick Annex, Pittsburgh, Pa., oil storage plant, 23 tanks, $178,000; 1 story, 40 x 60 ft., brick office, $10,000; 1 story, brick boiler house and machine shops, $7,500; 1 story, 40 x 60 ft. pump house, $5,000; 1 story, 30 x 85 ft., steel truck filling shed, $1,800, at 220-250 West Jefferson St. E. N. Gibson, 3026 Hotel Cleveland, asst. engr. (temporarily.)

Alta., Turner Valley—WASTE GAS DEVELOPMENT — Hercules Consolidated & Smelting Co. Ltd., London, England, R. Cross-Swords, pres., development of waste gas into 1 gas pipe line, using pressure of gas to turn specially designed turbine wheels in manufacture of electrical energy. Initial expenditure $10,000,000.

BIDS ASKED

Calif., Oakland—SPRINKLER SYSTEM—See "Warehouses."

N. Y., Creedmoor—REFRIGERATION—May 6, by Commissioner Dpt. Mental Hygiene, State Office Bldg., New York, refrigeration work for laboratory building and electrical service connections to superintendent's lodge, Creedmoor Div., Brooklyn State Hospital.

Pa., Avella—COAL WASHER—Pittsburgh Terminal Coal Corp., Wabash Bldg., Pittsburgh, taking sub-bids coal washer. $125,000. Construction in charge J. Pursglove, Jr., engr., Mine 2, Castle Shannon.

CONTRACTS AWARDED

Mass., Everett—CONCRETE BINS—New England Fuel & Transportation Co., 250 Stuart St., Boston, 1 story, concrete bins, Rover St. extension, to Rust Eng. Co., Centre St., Quincy, $86,705.

Mass., Holyoke—COAL POCKETS—Bibeau Coal & Oil Co., Inc., 61 Commercial St., coal pockets, 15 ft. diam., 35 ft. high, concrete, to Gifford-Wood Co., Hudson, N. Y., $15,000.

Mass., Salem—SILOS, etc.—New England Fuel & Transportation Co., 250 Stuart St., Boston, 4 concrete, brick, steel silos, garage, office, Canal St. extension, to Koppers Constr. Co., Koppers Bldg., Pittsburgh, Pa. Est. $75,000.

N. Y., New York—STATION FINISH WORK—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing station finish work for Bway.-Nassau Street and High St.-Brooklyn Bridge Stations, to Lustbader Building Co., 145 East 45th St., $242,605. Noted Mar. 12.

MATERIALS

PROPOSED WORK

ROAD OIL—**Austin, Minn.**—C. M. Hubbard, aud. Mower Co., purchasing 300,000 gal. road oil.

BIDS ASKED

ROAD OIL—**Anaheim, Calif.**—May 12, by E. B. Merritt, city clk., 1,000 bbl. road oil.

STRUCTURAL STEEL—**Oakland, Calif.**—See "Warehouses."

ROAD OIL, etc.—**Austin, Minn.**—May 12, by C. M. Hubbard, aud. Mower Co., 430,000 gal. road oil and 1 bituminous materials pressure distributor.

LUMBER—**New Jersey**—May 11, by State Hy. Comn., Trenton, 263,337 ft. B.M. lumber. A. L. Grover, ch. engr.; adv. E. N.-R. Apr. 30.

OIL—**Long Branch, N. J.**—May 5, by Bd. City Comrs., City Hall, 15,000 gal. oil. H. N. West, city clk.; adv. E. N.-R. Apr. 30.

ASPHALTIC CEMENT, etc.—**Brooklyn, N. Y.**—May 7, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 400,000 gal. asphaltic cement for sheet asphalt and bituminous concrete mixtures B in liquid form; 15,000 cu.yd. asphalt sand; 15,000 cu.yd. binder stone.

WIRE, etc.—**Brooklyn, N. Y.**—May 12, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., wire, cable.

ASPHALT, SLAG, STONE, etc. — **Cleveland Heights, O.**—May 2, by City, H. A. Canfield, mgr., necessary tar and liquid asphalt, slag, stone or gravel material for treating 200,000 sq.yd. streets; sheet asphalt and asphaltic concrete repairs to various streets and Kold-Patch asphalt for repairs. F. A. Pease Eng. Co., Terminal Tower, Cleveland, engrs.

Materials (Continued)

ROAD OIL—**Monongahela, Pa.**—May 1, by R. B. Albright, 20,000 gal. road oil in tank cars.

PUMP UNIT, CRANE, etc.—**Pittsburgh, Pa.** -May 5, by City, c/o E. G. Lang, dir. P. Wks., City-County Bldg., taking bids motor driven pump unit and accessories for Herron Hill Pumping Station, $7,500; furnishing, installing 15 ton traveling crane for Brilliant Pumping Station at Aspinwall.

CRUSHED LIMESTONE—**Washington, Pa.**—May 1, by Bd. Comrs. Washington Co., G. Wood, controller, Court House, 300 tons ¼ to ⅜ in. crushed limestone, f.o.b. Washington, 100 tons f.o.b. Houston, 100 tons f.o.b. Wylandville, 200 tons f.o.b. Westland, 100 tons f.o.b. Morganze.

CONTRACTS AWARDED

STEEL WATER PIPE—**Los Angeles, Calif.**—Bd. P. Wks., City Hall, 40,000 ft. 24- to 36-in. steel water pipe, to Western Pipe & Steel Co., 444 Market St., San Francisco, $250,000.

STEEL PIPE, etc.—**Upland, Calif.**—City Comn., furnishing 5,400 ft. 8 in. and 8,600 ft. 6 in. steel pipe, to Crane Co., 331 East 3rd St., Los Angeles, laying and welding above pipe, to A. W. Buecheer, Cucamonga, at $0.075 and $0.055 respectively.

BITUMINOUS PATCHING MATERIAL—**Boston, Mass.**—City, Supply Dpt., bituminous patching material, delivered as required, to Intercity Distributing Co., 417 Broadway, Chelsea, $25,600; 250,000 gal. asphaltic road oil, to Trimount Oil Co., 1840 Broadway, Everett, $11,975; 1,000 tons road asphalt and 100 tons asphaltic cement, to Standard Oil Co. of New York, Park Sq. Bldg., at $17.97 and $19.79 per ton respectively.

EMULSIFIED ASPHALT—**Boston, Mass.**—Supply Dpt., P. A. Chapman, supt., emulsified asphalt for cold patching, delivered as required, to Headley Emulsified Products Co., Franklin Trust Bldg., Phila., Pa., at $27.55 per ton; cold tar patching for ensuing year as specified, to Independent Coal Tar Co., 88 Broad St., $4,077.

CUTBACK ASPHALT—**St. Paul, Minn.**—City, C. A. Carlson, purch. agt., 150,000 gal. cutback asphalt, to Standard Oil Co., 3rd and Commercial Sts., $10,830.

ROAD OIL—**St. Paul, Minn.**—City, C. A. Carlson, purch. agt., 800,000 gal. road oil, to Standard Oil Co. of Indiana, 3rd and Commercial Sts., $31,875. Noted Apr. 2.

PIPE—**St. Louis, Mo.**—St. Louis Water Dpt., City Hall, 1,000 ft. 16 in. and 6,000 ft. 20 in. c.i. pipe, to Amer. Cast Iron Pipe Co., 2930 North 16th St., Birmingham, Ala., at $2.89 and $4.12 per lin.ft. respectively.

ROAD OIL—**St. Louis, Mo.**—City, c/o Supply Commissioner, 900,000 gal. more or less road oil and 1,500 tons asphaltic cement, to Standard Oil Co. of Indiana, 314 Jefferson Ave., at $0.229 per gal and $12.40 per ton respectively; tarvia, asphalt cement or equal, distributed by tank wagons to jobs as needed during year, to Barrett Co., Levee and Convent Sts., at $0.116 per gal. on Grades B and X, and $0.1375 per gal. on cutback asphalt.

CABLE and TAR—**Milwaukee, Wis.**—City Council, J. W. Nicholan, purch. agt., 284,000 ft. lead covered cable and steel taped cable, to Habirshaw Cable & Wire Corp., 233 Bway., New York, $29,829; 690,000 gal. tar for road surfacing, to Amer. Tar Products Co., Harrison Turnpike, Kearny, N. J., at $0.1185 per gal.

EQUIPMENT

PROPOSED WORK

TRUCKS — **Deadwood, S. D.** — Bd. Comrs. Lawrence Co. purchasing 2 trucks. G. B. Lawler, county hy. supt.

TRUCK—**Luverne, Minn.**—R. Koehn, aud. Rock Co., purchasing one 4-wheel drive truck.

BIDS ASKED

METERS and TRANSFORMERS—**Anaheim, Calif.**—May 12, by E. B. Merritt, city clk., 2 electric transformers equal to GE type H, 50 cycle, also electric meters.

STEAM CONDENSER — **Pasadena, Calif.** — May 15, by B. Chamberlain, city clk., furnishing, installing steam condenser **(a)** 2-pass c.i. shell **(b)** 2-pass welded steel plate shell surface condenser with 2 unequaled circulating pumps, appurtenances.

POWER PLANT EQUIPMENT — **Vernon, Calif.** — May 6, by T. J. Furlong, city clk., power plant equipment, incl. Diesel engine, generators, exciters, circulating water pump and air blower.

PATROL GRADERS—**Aitkin, Minn.**—May 5, by C. V. Kline, aud. Aitkin Co., 1 or more pull-type maintenance patrol graders.

TRACTOR, etc.—**Elk River, Minn.**—May 7, by C. S. Wheaton, Jr., aud. Sherburne Co., 1 crawler-type tractor, 20 to 30 hp. on drawbar and 1 pull-type road maintainer.

BITUMINOUS MATERIALS DISTRIBUTOR—**St. Paul, Minn.**—May 5, by C. A. Carlson, purch. agt., 1 bituminous materials distributor. W. N. Carey, city engr.

ROAD GRADER—**St. Paul, Minn.**—May 4, G. J. Ries, aud. Ramsey Co., 1 multiple blade road grader. P. N. Coates, Guardian Bldg., co. surv.

TRUCKS—**New York, N. Y.**—May 1, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., two 7½ ton gasolnie motor driven trucks (non-assembled).

PRODUCTION TOOLS—**Cleveland, O.**—Smith Eng. Co., S. H. Smith, pres.-genl. mgr., 1982 West 74th St., in market production tools to manufacture airplane parts.

METAL WORKING EQUIPMENT—**Columbus, O.**—Jones Auto Radiator Co., 74 North 4th St., in market metal working equipment.

LABORATORY EQUIPMENT—**Murfreesboro, Tenn.**—May 7, at office P. L. Harned, comr. Bd. Educ., 209 Memorial Bldg., Nashville, laboratory equipment for Science Building at Teachers College. Marr & Molman, 702 Stahlman Bldg., Nashville, archts.

TRACTORS—**Corpus Christi, Tex.**—May 13, by Nueces Co., c/o F. A. Tomkins, aud., 1 Cletrac 30-B- tractor for Precinct 1, 1 Massey and 1 Deering tractors for Precinct 2.

TRACTORS—**Corsicana, Tex.**—May 11, by Navarro Co., c/o J. M. Tullos, aud., 1 or more crawler type tractors.

GATE VALVES—**Milwaukee, Wis.**—May 5, by Central Bd. Purchases, J. W. Nicholson, purch. agt., sixty-nine 6- to 20-in. gate valves.

FOREIGN

Africa—May 30, by Municipality Parys, South Africa, 100 kw. or 150 kw. water turbines, driven or alternatively 150 kw., 170 kw., or 200 kw. oil driven alternators, and distribution system, on steel poles, incl. transformer substations, transformer, meters, motors and underground high tension feeder cable.

France, Havre—Vacuum Oil Co., 61 Bway., New York, will build oil refinery, separate contracts and day labor. $2,000,000-$4,000,000. Equipment awarded to Foster-Wheeler, Inc., 165 Bway., New York.

New Zealand, Wellington—June 9, by Dpt. P. Wks., 1 steam or alternating petrol or diesel excavator with creeper track, bucket capacity

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Commercial Buildings

RESIDENTIAL

BIDS ASKED

Calif., San Francisco — See "Contracts Awarded."

Conn., Stamford — Riverside Building Corp., 61 Greenwich Ave., taking bids 4 story, 80 x 132 ft., brick, rein.-con., Rippowam Rd. $150,000. W. R. Barto, 61 Greenwich Ave., archt.

Mass., Cambridge—R. M. Blackall, archt., 75 State St., Boston, taking bids 4 story, basement, 115 x 180 ft., brick, stone, steel, concrete found., Everett St., for Owner, c/o Architect, $200,000; heating and ventilating, $25,000; plumbing and electrical work, $25,000.

N. J., Hillside—See "Contracts Awarded."

N. J., Jersey City — W. L. Custer, archt., Stanley Bldg., Bridgeton, taking bids general contract 3 story, basement, 85 x 135 ft., brick, steel, 20th and Wesley Aves. at Boardwalk for Neptune Arms, c/o architect. $150,000.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

Ont., Ottawa—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., San Francisco—J. Exnicios, 135 Darien Way, 6 story, basement steel, concrete, Gough and Bway. Sts., day labor, segregated contracts. $165,000

N. J., Hillside — W. A. Lampe, 539 Clinton Pl., two 3 story, basement, brick, Williamson and Bayview Aves., separate contracts. $150,000. J. Wind, Jr., 1450 North Broadway, archt.

N. Y., Brooklyn—W. Bordfeld, 2821 Avenue N, 6 story, basement, 80 x 84 ft., Quentin Rd. and East 16th St., separate contracts. $150,000. W. A. Lacerenza, 26 Court St., archt.

N. Y., Brooklyn—Brightwater Court Corp., c/o M. Perlow, 16 Court St., 6 story, 85 x 100 ft., Bunting St. and Brightwater Court, separate contracts. $175,000. B. W. Dorfman, 66 Court St., archt.

N. Y., Brooklyn—Conbar Realty Corp., 1075 East 7th St., 6 story, 83 x 90 ft., East 98th St. and Cortelyou Rd., separate contracts. $150,000. W. T. McCarthy, 147 Pierrepont St., archt.

N. Y., Brooklyn—Corporation, c/o D. N. Boyd, 1578 Carroll St., 6 story, 100 x 147 ft., brick, steel, Avenue P and West 9th St., separate contracts. $225,000. M. Rothstein, 186 Joralemon St., archt.

N. Y., Brooklyn—Corporation, c/o M. Kalt, 26 Court St., 6 story, 84 x 100 ft., brick, steel, Bunting St. and Brightwater Court, to Elpay Realty Co., 26 Court St. Est. $165,000.

N. Y., Brooklyn—Green Wein Building Corp., 1488 President St., H. Greenberg, pres., 6 story, 100 x 200 ft., brick, steel, Avenue O and Delamere Ave., separate contracts. $320,000. M. Hirsch, 350 Stone Ave., archt.

N. Y., Brooklyn—J. D. B. Constr. Co., J. D. Berg, pres., 26 Court St., 6 story, 75 x 109 ft., Woodruff Ave. and East St. Paul's Pl., separate contracts. $150,000. Cohn Bros., 215 Montague St., archts.

N. Y., Brooklyn—Kelley & Will Realty Corp., 1053 Nostrand Ave., 6 story, 84 x 100 ft., brick, steel, East 142nd St. and Avenue S, separate contracts. $160,000. M. N. Weinstein, 93 Court St., archt.

N. Y., Brooklyn—L. D. J. Homes, Inc., L. Josephson, pres., 525 Linden Blvd., 2 story, basement, Clarendon Rd. and East 48th St., separate contracts. $160,000. F. Ober, 44 Court St., archt.

N. Y., Brooklyn—I. Rosenberg, 2151 80th St., apartment, Avenue I and East 49th St., separate contracts. $500,000. I. Kallich, 26 Court St., archt.

N. Y., Brooklyn—Singer Building Co., O. Singer, pres., 160 East 53rd St., 6 story, Empire Blvd. and Schenectady Ave., separate contracts. $310,000. M. Hirsch, 350 Stone Ave., archt.

N. Y., Brooklyn—Solspan Building Corp., M. J. Alexander, pres., 951 45th St., apartment, 17th Ave. and 57th St., separate contracts. $150,000. M. Rothstein, 186 Joralemon St., archt.

N. Y., Brooklyn—Thirty-Five Parade Corp., A. C. Immig, pres., 186 Clarkson Ave., 6 story, 90 x 125 ft., Woodruff Ave. and Parade Pl., separate contracts. $200,000. Cohn Bros., 215 Montague St., archts.

N. Y., Brooklyn—Wilset Building Co., 1819 Bway., New York, apartment, Fillmore Ave. and East 33rd St., separate contracts. $290,000. P. Freshman, 50 Court St., archt.

N. Y., Forest Hills—Knott Hotels Corp., 235 West 46th St., hotel addition, to Geekie Naughton & Co., 420 Lexington Ave., New York. Est. exceed $150,000.

N. Y., New York—Beckmar Realty Corp., L. Grodsky, pres., 496 East 138th St., 6 story, 50 x 70 ft., brick, steel, Morris and Mount Eden Aves., separate contracts. $150,000. Private plans.

N. Y., New York — Carrvin Realty Corp., 2560 Boston Rd., apartment, Tenbrouck and Arnow Aves., separate contracts. $175,000. G. J. Prowler, 367 Fulton St., Brooklyn, archt.

N. Y., New York — Corporation, c/o S. Schwartz, 666 East Tremont Ave., 6 story, 66 x 74 ft., brick, steel, 167th St. and Hall Pl., separate contracts. $150,000. A. F. Inserro, 190 West 168th St., archt.

N. Y., New York—Corporation, S. Behrman, pres., c/o W. I. Hohauser, archt., 17 West 44th St., 6 story, basement, brick, steel, 210 East 75th St., separate contracts. $150,000.

N. Y., New York—Derwin Constr. Co., 2160 Wallace Ave., 6 story, 85 x 200 ft., Olinville Ave. and 213th St., separate contracts. $300,000. Becker & Levy, 349 East 149th St., archts.

N. Y., New York—Aaron Goodman, 2033 Hobart Ave., 6 story, 207th St. vicinity Vermilyea Ave., separate contracts. $150,000. J. Bleich, 565 East Tremont Ave., archts.

N. Y., New York—Harno Building Corp., 701 East Tremont Ave., 6 story, basement, brick, steel, 230th St. and Kingsbridge Rd., separate contracts. $166,000. R. Gottlieb, 4756 3rd Ave., archt.

N. Y., New York—F. Meli, 1228 Grand Concourse, 6 story, basement, brick, steel, Creston Ave. and 181st St., separate contracts. $150,000. C. B. Cali, 81 East 125th St., archt.

N. Y., New York—Olin Buildings Corp., 3034 White Plains Ave., 6 story, 100 x 102 ft., brick, Olinville and Burke Aves., separate contracts. $180,000. Private plans.

N. Y., New York—Rames Constr. Co., 945 East 178th St., 6 story, 175th St. and Vineyard Pl., separate contracts. $225,000. H. Ginsberg, 205 East 42nd St., archt.

N. Y., New York—Raymore Constr. Co., 4756 3rd Ave., 6 story, Jerome Ave. and 198th St., separate contracts. $150,000. R. Gottlieb, 4756 3rd Ave., archt.

N. Y., New York — G. Vuchio, 235 East 196th St., 5 story, basement, brick, steel, Vireo Ave. and 239th St., separate contracts. $150,000. A. R. Perillo, 575 East 184th St., archt.

O., Lakewood — Arbor Realty Co., I. Margolin, 1575 East Blvd., masonry contract for two 4 story, basement apartments, Lake and Cove Aves., to B. Zuckerman, 3601 East 154th St., Cleveland; carpentry, to I. Weiberg, 4462 West 35th St., Cleveland. Est. $300,000.

Ont., Ottawa — W. Shankman, 271 Laurier Ave. E., 3 story, basement, brick, steel, concrete apartments, separate contracts; excavation awarded to Mahoney & Rich, 88 Bank St. Est. $150,000. C. Burgess, 53 Queen St., archt.

CLUBS

PROPOSED WORK

Mo., Kansas City—Mission Hills Country Club, 53rd St. and State Line Rd., plans by Keene & Simpson, Land Bank Bldg., club house. $200,000.

N. J., Newark—Contemporary Club, O. L. Butcher, chn., 150 South Clinton St., will not build club house. $150,000. Project abandoned. Noted Mar. 5.

Vt., Burlington — Burlington Y. M. C. A., D. W. Howe, chn. Building Comn., plans by F. L. Austin, 240 College St., 3 story, 115 x 150 ft., brick, stone building, incl. swimming pool, lockers showers, hall, Union and College Sts. $300,000.

Clubs (Continued)

BIDS ASKED

N. J., Newark—Italian Catholic Union Holding Co., and J. Centanni, archt., 142 Market St., taking bids 2 story, basement, 60 x 100 ft. club house, Summer Ave. $150,000. Noted Apr. 2.

CONTRACTS AWARDED

N. J., Long Branch — Villa Beach Club, N. White, pres., 307 5th Ave., New York, general contract 2 story, basement, brick, steel club, convention hall, Ocean Front near Aveneal Ave., to S. A. Solomon, 307 5th Ave., New York. Est. $250,000. Contractor will build by day labor. Noted Apr. 9.

Tex., Fort Worth—Masonic Temple, c/o W. S. Cooke, Fort Worth Natl. Bank Bldg., general contract 4 story, basement, 125 x 165 ft., stone, rein.-con. masonic temple, to H. B. Friedman, 1st Natl. Bldg. Est. $1,000,000, incl. furnishings. Noted Mar. 26.

HOSPITALS

PROPOSED WORK

Conn., Hartford—Hartford Hospital, 23-25 South Hudson St., L. K. Sexton, soon lets contract 2 story, basement, 60 x 110 ft., brick, steel, concrete nurses' education building, incl. swimming pool, South Hudson St. $150,000. Kendall, Taylor & Co., 209 Columbus Ave., Boston, Mass., archts.

Mich., Wahjamega—State Administrative Bd., Michigan Farm Colony for Epileptics, State Bd., Lansing, plans by Cowles & Mutscheller, Saginaw, 3 story, basement, brick, rein.-con. steel, stone hospital, plain found. $300,000.

Nev., Reno—Washoe Co. plans by F. H. DeLongchamps, Gazette Bldg., hospital. $150,000. Noted Jan. 1.

N. J., Hackensack — Hackensack Hospital Assn., G. G. Ackerson, pres., 3rd St., 4 story, basement, brick, steel addition, 3rd St. $150,000. Project in abeyance. Crow, Lewis & Wick, 200 5th Ave., New York, archts. Noted Apr. 9.

N. J., Hasbrouck Heights—Hasbrouck Heights Hospitals, H. K. Cohan, supt., 272 Columbus Ave., new sketches by J. D. Lugosch, 714 Bergenline Ave., Union City, 3 story, basement, brick, steel, Columbus Ave. $150,000.

N. Y., Eastview—Bd. Supervs. Westchester Co., F. L. Merritt, clk., sketches by Walker & Gillette, 599 Madison Ave., New York, general contract new diet kitchen and laboratory buildings, at Grasslands. Contractors to submit qualifications to Commissioner Budget & Accounts, Court House, White Plains, not later than May 12; adv. E. N.-R. Apr. 30.

Pa., Carbondale—Carbondale General Hospital soon takes bids 1 and 4 story, rein.-con., brick, plain found., Fallbrook St. To exceed $150,000. R. E. Tiffany, Carbondale, archt.

Pa., Phila.—Realty Assets Corp., c/o J. J. McDevitt, Jr., 2 story, basement, 140 x 240 ft., rein.-con., brick, steel hospital, plain found., 1505-9 Spruce St. Architect not selected.

Vt., Waterbury—Vermont State Hospital for Insane, W. H. Dyer, State House, Montpelier, plans by F. L. Austin, 240 College St., Burlington, 2 story, basement, 60 x 150 ft. female dormitory ward, brick, concrete, steel, plain found. $150,000. Noted Mar. 5.

Ont., Brockville — Dpt. P. Wks., Parliament Bldgs., Toronto, 2 or 3 story, basement, brick, concrete steel nurses' building in connection with Ontario Hospital. $156,000.

Ont., Woodstock—Dpt. P. Wks., Parliament Bldgs., Toronto, hospital additions to Ontario Hospital, $155,000, nurses' building $75,000, laundry building, equipment $65,000, all brick, concrete, stone, steel.

BIDS ASKED

Calif., Los Angeles — A. C. Martin, archt. Higgins Bldg., taking bids 2 story, rein.-con., steel hospital addition, Bellevue Ave., for Queen of Angeles Hospital, 2301 Bellevue Ave.

Conn., Hartford—May 8, by City, W. E. Batterson, 5 story, brick, steel, stone hospital, Vine St. $600,000. Ebbets & Frid, 15 Lewis St., archts. W. H. Walsh, 612 North Michigan Ave., Chicago, Ill., engr. Noted Mar. 5.

Conn., Mansfield—May 4, by State, Mansfield Training School, Old Senate Chamber, State Comptroller, brick, steel nurses' home, administration building addition. $200,000. Golden Storrs & Co., 11 Asylum St., Hartford, archts. Noted Mar. 26.

Conn., Norwich—May 4, by State, Uncas-On-Thames Sanatorium, Old Senate Chamber, State House, Hartford, brick, steel infirmary buildings $288,000, and nurses' home $108,000, at sanatorium, Uncas-On-Thames. W. A. Kinne, 256 Main St., Derby, archt., for former, and Cudworth & Thompson, Disco Bldg., Norwich, archts. for latter buildings. Noted Apr. 2.

Mass., Boston—May 7, by City, Hospital Dpt., 3 story, basement, brick, limestone, steel pediatric building (children's hospital unit), concrete found., at Boston City Hospital, Harrison Ave. $325,000. J. H. Ritchie & Associates, 250 Stuart St., archts. Noted Oct. 30.

Mass., Boylston—May 8, by Worcester Co. Tuberculosis Hospital, W. Goodale, chn. comrs. Court House, and Frost, Chamberlain & Edwards, archts., 390 Main St., Worcester, 1, 2 and 3 story, basement, brick, stone, concrete, steel hospital, plain found., Kendall Farm, Boylston and West Boylston. $1,000,000. Noted Apr. 16.

Mo., Jefferson City—May 2, by St. Mary's Hospital, c/o Mother Superior, 4 story, basement, brick, steel, rein.-con. addition, Miller and Boliver Sts. O'Meara & Hills, 1036 Arcade Bldg., St. Louis, archts. Noted Apr. 23.

N. Y., New York—Beth Israel Hospital, 60 Jefferson St., taking bids altering and constructing hospital addition, $150,000. H. Hurwit, 41 West 33rd St., archt. Contract to be awarded late in May. Noted Apr. 2.

O., Massillon — May 12, by State, J. McSweeney, dir. P. Welfare, 2 story, basement, 90 x 179 ft., brick, steel, concrete chapel and employees building. $250,000. T. R. Ridley, Ohio-Hartman Bldg., Columbus, archt. Noted Mar. 12.

O., Newark—May 11, by C. Frey, clk. Licking Co., Hospital Comn., 3 story, basement, 160 x 280 ft., brick, concrete tuberculosis hospital, laundry plant, refrigeration plant. $200,000. Carmichael & Millspaugh, 5 East Long St., Columbus, archt.

CONTRACTS AWARDED

Ill., Aurora—Schmidt, Garden & Ericksen, archts., 104 South Michigan Ave., Chicago, general contract altering and constructing 5 story, L shaped, rein.-con., brick hospital, for Copley Hospital, to Hutter Constr. Co., Fond du Lac, Wis., plumbing and heating, to E. Clark, Aurora; electric wiring, to T. Schommer, Aurora; ventilating, to Warning Sheet Metal Wks., Oshkosh, Wis. Est. $400,000. Noted Mar. 12.

Md., Baltimore — Johns Hopkins Hospital, Wolfe and Monument Sts., Hurd Lecture Hall, brick, steel, concrete, Wolfe and Monument Sts., to Consolidated Eng. Co., 20 East Franklin St., $150,000.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., J. G. Greeff, comr., general contract altering and constructing additions to out patient building, Gouverneur Hospital, to Hudson Contg. Co., 1257 Bway., $147,900; heating, to Dierks Heating Co., 210 East 31st St., $156,356; plumbing, to J. H. Kandel, 992 2nd Ave., $58,865. Grand total $363,121. Noted Mar. 26.

N. Y., Wingdale—Dpt. Mental Hygiene, State Office Bldg., Albany, general contract continued treatment building at Harlem Valley State Hospital, to J. J. Finn & Sons, 196 Lark St., Albany, $2,720,000; heating, to Callahan Eng. Co., 5-7 Intervale St., White Plains, $126,997; sanitary work, to H. Homer & Sons, Inc., 1708 Gravesend Ave., Brooklyn, $198,300; electrical work, to Blanding Electric Supply Co., Inc., 198 Washington St., Binghamton, $59,487. Grand total $3,104,783. Noted Feb. 26.

Ont., Hamilton — Dpt. P. Wks., Parliament Bldgs., Toronto, 1 and 2 story, basement, concrete, brick, steel, stone assembly hall at hospital, to Tope Constr. Co., 945 King St. W. Est. $150,000.

CHURCHES

PROPOSED WORK

Calif., Los Angeles—Roger Williams Baptist Church, 29th St. and Orchard Ave., sketches new church. $200,000. Architect not selected.

Mass., Lynn — Washington St. Church (Baptist), C. H. Howe, pastor, Essex St., parish house, Exeter and Washington Sts. $150,000. Architect not selected.

N. J., Newark—Our Lady of Mount Carmel Roman Catholic Church, E. D. Aquilla, pastor, East Mechanic St., 2 story, basement church, Oliver St. between Adams and Van Buren Sts. $150,000. Raising funds. **Maturity probably in July.** H. J. Weiler, 40 Komorn St., archt. Noted Mar. 26.

N. J., New Brunswick — Christ Episcopal Church, W. H. Stone, pastor, 216 Lawrence St., revised plans by P. L. Fowler, 224 East Hanover St., Trenton, 3 story, basement, brick, steel rectory, College Ave. between Richards and Huntington Sts. $150,000. Noted Feb. 12.

N. J., Nutley—St. Mary's Roman Catholic Church, St. Mary's Pl., sketches general contract altering and constructing 2 story, basement addit;on. $150,000.

N. J., Passaic — St. Peter and Pauls Polish Natl. Church, J. Wroblewski, pastor, 126 River Dr., sketches by J. T. Camlet, 26 Piaget Ave., Clifton, 2 story, basement, brick, steel, Armory Park. $150,000.

Pa., Oil City—First Presbyterian Congregation, T. G. Koontz, pastor, 3 Harriott Ave., and F. B. Hall, chn. building com., Woolworth Bldg., sketches church, Spring St. and Harriott Ave. $150,000. Architect not selected.

Ont., Forest Hill — Our Ladies of Charity plans by A. W. Holmes, 79 St. Joseph St., monastery. $150,000.

Que., Montreal — Amer. United Church of Canada new church, Dorchester St. W., $350,000.

BIDS ASKED

Conn., Hartford—May 6, by St. Justin's Roman Catholic Parish, F. P. Nolan, pastor, (selected list of bidders), 2 story, belfry, 60 x 150 ft., brick, stone, marble church, Blue Hill Ave. $400,000. Whiton & McMahon, 805 Main St., archts. Noted Mar. 12.

N. J., Dunellen—Poggi & Bragdon, archts., 215 Morris Ave., Elizabeth, and A. M. Korff, assoc. archts., 203 Park Ave., Plainfield, bids about June 1, general contract 2 story, basement, brick, steel parish house, for First Methodist Church. $200,000. Noted Apr. 9.

N. J., East Orange—Fanning & Shaw, archts., 49 Ward St., Paterson, taking bids 2 story, basement, brick, steel, Tremont Ave. and Tilford St., for St. Joseph Roman Catholic Church, c/o architects. $150,000.

N. J., Guttenburg—May 1, by W. G. Bartels, archt., 270 Main St., Hackensack, 2 story, basement, brick, steel church, Bergenline Ave., for Little Church on the Hill, D. R. Reese, pastor, 326 24th St. Est. $150,000. Noted Apr. 23.

N. J., New Brunswick—P. L. Fowler, archt., 224 East Hanover St., Trenton, taking bids general contract 3 story, basement, brick, steel rectory, College Ave. between Richardson and Huntington Sts., for Christ Episcopal Church, W. H. Stowe, pastor, 216 Lawrence St. Est. $150,000. Noted Apr. 23.

N. J., Nutley — Latenser, Bastow & Way, archts., 15 East 40th St., New York, bids about May 1, general contract altering and constructing 2 story, basement, brick, steel convent addition, St. Mary's Pl., for St. Mary's Roman Catholic Church, St. Mary's Pl. $150,000. Noted Apr. 23.

Wis., Kenosha—May 4, by C. O. Augustine, archt., Kenosha, and W. C. Weeks, Inc., archts., Sheboygan, 1 story, 56 x 151 ft. church, 3 story, 73 x 151 school, and 54 x 79 ft. gymnasium, all brick, concrete, steel, plain founds., for Holy Rosary Catholic Church. Est. $300,000.

CONTRACTS AWARDED

Conn., Hartford — Asylum Avenue Baptist Church, F. B. Haggard, pastor, rebuilding church, Asylum and Sigourney Sts., to R. G. Bent Co. Inc., 93 Edwards St., $73,500. Noted Apr. 2, under "West Hartford."

Conn., Middletown—St. Sebastian Roman Catholic Church, A. Santolini, pastor, 930 Dixwell Ave., 1 story, basement, 65 x 125 ft., granite church, to S. Mazzotta, Mazzotta Pl. Est. $150,000. Noted Apr. 16, under "Contracts Awarded."

Ind., Indianapolis — Pleasant Run Boulevard Reformed Church, South Meridian St. and Pleasant Run Blvd., general contract steel, limestone, to Foster Eng. Serv. Co., 726 Indiana Pythian Bldg. Est. $150,000.

N. J., Westfield—A. R. Hennell, archt., 636 Prospect St., general contract 3 story, basement, brick, steel parish house, to A. Milne, 148 Park Ave., Plainfield, for St. Paul's Church. $150,000. Noted Apr. 2.

SCHOOLS

PROPOSED WORK

Del., Milford—Delaware School Foundation, DuPont Bldg., Wilmington, revised sketches by Guilbert & Betelle, 20 Branford Pl., Newark, N. J., 2 story, basement, brick, steel grade and high school addition, plain found. $150,000.

Ill., Mooseheart—Loyal Order of Moose, c/o J. J. Davis, dir., Wash., D. C., general of Supreme Lodge, sketches vocational school, chapel building, group boys cottages. $1,500,000.

Ind., Evansville—St. Anthonys Parish plans by E. C. Berendes, 121 Northwest 4th St., 2 story, basement, 66 x 217 ft., rein.-con. brick, limestone school, 2nd Ave. and Columbia St. $150,000.

Ind., Indianapolis—College of Religion, auxiliary of Butler College, sketches College of Religion, on Butler Campus, 46th St. and Sunset Ave. $200,000. Architect not selected.

Ind., Laporte — School Comrs. bids during May, 2 story, basement; 78 x 217 ft., brick, steel high school, Harrison St. $150,000. G. W. Allen, 209 Savings Bank Bldg., archt. Noted Mar. 12.

Ind., South Bend — Notre Dame University, C. L. O'Donnell, pres., plans by F. W. Kerrick, South Bend, rein.-con., stone college engineering building, on campus. $500,000. R. Hattis, 6 North Michigan Ave., Chicago, Ill., engr.

Ia., Des Moines—Drake University Dormitory Assn., H. J. Clark, member of board, and Drake University, D. W. Morehouse, pres., plans by Tinsley, McBroom & Higgins, 702-3 Hubbell Bldg., and Proudfoot, Rawson, Souers & Thomas, assoc. archts., 810 Hubbell Bldg., womens dormitory, rein.-con., brick, stone, 28th St. and University Ave. $200,000. Noted Feb. 5.

Me., Farmington—Town, W. L. Butler, chn. Building Com., plans by Coombs & Harriman, 11 Lisbon St., Lewiston, 2 story, basement, brick, plain found., Quebec St. $150,000.

Mass., Cambridge — City, School Comn., sketches by R. H. Doane, 60 Batterymarch St., Boston, Rindge Technical High School, Broadway, Felton and Cambridge Sts. $1,500,000.

Mass., Falmouth—Town, A. L. Pattee, chn. School Bd., sketches by H. F. Kellogg, 378 Stuart St., Boston, 2 story, basement, brick, stone school, plain found. $175,000. Noted Mar. 26.

Mass., Framingham—Town, J. G. Slattery, chn. Bd. Wks., sketches by G. F. Marlowe, 240 Boyleston St., Boston, altering and constructing 3 story, basement, brick, stone high school addition, plain found., Union Ave. $150,000. Noted Mar. 12.

Mass., Groveland—Town, G. A. Keith, supt. schools, plans by H. L. Meacham Associates, 120 Front St., Worcester, 2 story, basement, brick, steel high school. $150,000. Noted Apr. 2.

Mass., Hamilton—Town, J. Lamson, chn. Bd. Selectmen, plans by C. G. Loring, 7 Water St., Boston, 3 story, basement, brick, stone high school. $150,000-$160,000. Noted Mar. 19.

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Schools (Continued)

Mass., Hanover — Town. School Building Comn., sketches by J. W. Beal Sons Co., 185 Devonshire St., Boston. 2 story, basement, brick, stone school. $150,000.

Mass., Pittsfield—Roman Catholic Dioceses, c/o J. W. Donohue, archt., 1200 Main St., Springfield. 3 story, basement, 110 x 285 ft., brick, steel, stone parochial high school, Linden St. $350,000.

Mass., Raynham — Town, School Building Comn., plans by E. M. Corbett, 167 Bedford St., Fall River, Centre St. School, 2 story, basement; and plans by F. I. Cooper Corp., 47 Winter St., Boston, 1 story, basement school, South Dist., both brick, plain founds. $150,000. Noted Feb. 5.

Mass., Springfield—City, School Bd., brick, steel, school, Haskin, Fisher and Lydia Sts. $150,000. Architect not selected.

Mass., Weymouth—Town, P. R. Tirrell, chn. building com., 2 story, basement, brick school, Weymouth Heights. $150,000. Architect not selected. Noted Feb. 19.

Mich., Flint—Michigan School for Deaf, I. B. Gilbert, supt., plans by MacKenzie & Pratt, Flint, 2 story, basement, brick, steel, rein.-con. dormitory, and 3 story, brick, steel, stone, rein.-con. shop building. $150,000.

Mo., Rolla — Missouri School of Mines & Metallurgy, E. Kahlbaum, bus. mgr., concrete, brick, stone school. $250,000 voted but may not be released until 1932.

Neb., Omaha — Creighton University, 25th and California Sts., sketches rein.-con., brick, steel egineering school, 28th and California Sts. $250,000.

N. H., Bethlehem—Bethlehem School Dist., sketches by Haynes & Mason, 280 Main St., Fitchburg, Mass., 2 story, basement, 75 x 145 ft., brick, concrete high and grade school. $150,000.

N. J., Bloomfield—Bd. Educ., City Hall, revised plans by Barlett & Marsh, Lefcourt Bldg., Newark. 2 story, basement, brick, steel, Watchung and Broughton Ave. $300,000. Noted Mar. 5.

N. J., East Orange—Bd. Educ., 19 Winan St., sketches 2 story, basement, brick, steel, Eastern Dist. $150,000. Hacker & Hacker, 201 Main St., Fort Lee, probable archts. Noted Apr. 2.

N. J., Englewood — Englewood School for Boys, 35 Dwight Pl., 2 story, basement boys' school. $150,000. Architect not selected. **Maturity about July.** Raising funds. Noted Apr. 9.

N. J., Hillsdale—Bd. Educ., G. M. Strohsable, dist. clk., sketches by Hacker & Hacker, 201 Main St., fort Lee, Junior High School, 2 story, basement, brick, steel, Demarest Ave. $150,000.

N. J., Lodi—Bd. Educ., A. Cody, pres., Wilson School, 2 story, basement, brick, steel school. $150,000. Architect not selected. **Maturity about September.** Noted Feb. 26.

N. J., Montclair—State Bd. Educ., State House Annex, Trenton, sketches by Guilbert & Betelle, 20 Branford Pl., Newark, 3 story, basement, brick, steel normal school addition. $150,000 or more. Noted Jan. 29.

N. J., Morgan—Bd. Educ. will not build 2 story school. Project abandoned. Noted Mar. 12.

N. J., Teaneck (br. Hackensack)—Bd. Educ., High School, 2 story, basement, brick, steel school. $215,000. Architect not selected.

N. J., Union—Bd. Educ., 2 story, basement, brick, steel, Stuyvesant Heights. $150,000. **Maturity probably in July.** F. A. Elsasser, 1000 Stuyvesant Ave., archt. Noted Mar. 26.

N. J., Union—Bd. Educ. revised sketches by F. A. Elsasser, Morris Ave., 2 story, basement, brick, steel, North End Section, Oakland Ave. $200,000. Noted Mar. 6.

N. J., Woodbridge—Bd. Educ., 1 Barron Ave., 2 story, basement, brick, steel school, Strawberry Hill Ave. $150,000. **Maturity probably in June.** Jensen & Rasmussen, 218 Smith St., Perth Amboy, archts. Noted Mar. 19.

N. Y., Lion Mountain (br. Plattsburg)—Bd. Educ. plans by H. D. Fullerton, Natl. City Bank Bldg., Cleveland, O., 2 story, basement, 57 x 134 ft., brick, steel, concrete general grade school. $150,000.

N. Y., New York—Bd. Educ., 500 Park Ave., soon takes bids 4 story top addition to Washington Irving High School, East 16th St. and Irving Pl. $1,000,000. W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt.

N. Y., New York — Catholic Institute for Blind, J. G. Neeser, plans by R. J. Reiley, 12 East 41st St., 3 story institute, Paulding Ave. and 220th St. $150,000.

O., Tiffin—City, Bd. Educ., plans by T. D. McLaughlin, Lima, 2 story, basement high school addition. $155,000.

Pa., Glenshaw—Bd. School Director Shaler Twp., F. C. Koussman, pres., sketches brick, steel grade school. $250,000.

Tex., San Marcos—Bd. Educ., H. G. Walker, San Marcos, voted $200,000, school. Noted Apr. 2.

Vt., Burlington—Mount St. Mary Academy, M. Alphonsus, plans by J. P. Heffernan & J. M. Gray, 175 High St., Boston, Mass., 2 story, basement, brick, steel school, Mansfield Ave. $150,000-$200,000. Noted Mar. 13, 1930.

Ont., Toronto — Bishop Strachan School, Lonsdale Rd., plans by Sproatt & Rolph, 1162 Bay St., 2 story, basement, stone, concrete school addition. $150,000. Noted Mar. 26.

Que., Montreal—Protestant Bd. School Comrs., Belmont St., plans by W. K. G. Lyman, 2058 Victoria St., for school, Rosedale Ave., $100,000; plans by Shorey & Ritchie, 2048 Union St., school, Java Ave., $100,000.

BIDS ASKED

Del., Marshallton—Delaware School Foundation, A. J. Taylor, pres., Du Pont Bldg., Wilmington, bids about May 15, Marshallton Consolidated School, general contract 2 story, brick, steel, plain found., Brandywine Hundred Dist. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted Apr. 2, under "Brandywine Hundred."

D. C., Wash.—May 4, by District Comrs., District Bldg., domestic service building at District Training School, near Laurel, Md.

Ind., Boone Grove—School Comrs., bids about May 1, rein.-con., brick, stone township school. $150,000. J. Bruck, Kentland, archt.

Ind., South Bend—University of Notre Dame, C. L. O'Donnell, pres., taking bids College Commerce Building, 2 story, basement, 90 x 200 ft., rein.-con., brick, stone. $200,000. Graham, Anderson, Probst & White, 80 East Jackson Blvd., Chicago, Ill., archts. Noted Dec. 4.

Ind., Wheatfield—School Comrs., bids about May 1, brick, steel school. $150,000. T. Bruck, Kentland, archt.

Mass., Norwood—May 8, by Town, W. L. Grant, supt. schools, Washington St., and W. G. Upham, archt., Bigelow Bldg., altering and constructing 2 story, basement, brick, stone addition to Senior High School, plain found. $150,000. Noted Apr. 16.

Mich., Detroit—May 1, by C. A. Gadd, bus. mgr., Bd. Educ., 2 story, basement, brick, steel, rein.-con. intermediate school unit, plain found., Waterloo and Duboise Sts. $200,000. Malcolmson & Higginbotham & Trout, 1217 Griswold St., archts.

Mo., St. Joseph—May 1, by Bd. Educ., A. L. Loving, secy., Lindbergh School, 2 story, basement, brick, stone, rein.-con., St. Joseph and Concord Aves. $160,000. Webb Seimens, 503 Bartlett Bldg., St. Joseph, and W. B. Ittner, Inc., Continental Life Bldg., St. Louis, archts.

N. J., Jamesburg—May 10, by Bd. Educ., general contract 2 story, basement, brick, steel high school, Buckelew and Davison Aves. $150,000. J. N. Pierson & Son, 198 Jefferson St., Perth Amboy, archts. Noted Apr. 23.

N. J., Paulsboro—Bd. Educ. taking bids 2 story, basement, 116 x 127 ft. high school. $175,000. Edwards & Green, Bway. and Stevens Sts., Camden, archts. Noted Oct. 23.

N. Y., Hollis — **May 7**, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general contract additions to P. S. 118, 109th Rd., from 190th Pl. to 191st St., for Bd. Educ., 500 Park Ave., New York.

N. Y., Malone — **May 19**, by Commissioner Educ., Education Bldg., Albany, repairing, altering buildings at Northern New York Institute for Deaf Mutes.

Ohio—May 4, by Bd. Educ., Clearview School Dist., Lorain Co. (Elyria), C. A. Bemis, clk., 2 story, basement, 75 x 140 ft., brick, steel, concrete high school addition. $150,000. W. G. Caldwell, Standard Trust Bldg., Cleveland, archt.

Pa., McKeesport—May 11, by Bd. Educ., J. B. Ritchey, supt., Ariel Bldg., brick, steel, 28th St. $180,000. Schwab, Palmgreen & Merrick, Koppers Bldg., Pittsburgh, archts. Noted Jan. 22.

CONTRACTS AWARDED

Conn., Waterbury—St. Ann's Parish, E. A. Lamontague, pastor, 3 story, basement, brick, steel elementary parochial school, plain found., East Clay St., to Charles Smith & Co., Inc., 101 Water St., Derby. Est. exceeds $150,000. Noted Feb. 26.

Mass., Boston—Suffolk Law School, c/o R. T. Jackson, archt., 44 School St., 4 story, basement, brick, steel law school, plain found., to J. C. Pitcher, 46 Cornhill. Est. $150,000 or more. Noted Apr. 9.

Mass., Dover—Town, M. W. Comisky, chn. com., Junior and Senior High School, 2 story, basement, 75 x 120 ft., brick, stone, concrete found., to Archdeacon & Sullivan, Inc., 1742 Washington St., Boston. Est. $150,000. Noted Mar. 5.

Mich., Detroit — Bd. Educ., 1354 Broadway Ave., 2 story, basement, brick, steel, rein.-con., plain found., Dryden and Trenton Aves., to T. J. Keim, 22128 Grand River Ave.; steam heating, to Harrigan & Reid, 1365 Baker St. Est. $150,000.

Minn., St. Paul—St. Luke's School, J. C. Byrne, pastor, 22 Lexington Ave. N., general contract 3 story, 86 x 215 ft. rein.-con., brick, Portland Ave. and Victoria St., to E. J. Dunnigan, 1012 Builders Exchange. Est. $250,000. Noted Jan. 22.

Minn., Windom—Bd. Educ., H. C. Beise, clk., general contract 2 story, basement, rein.-con., brick, stone, to G. Schwartz & Co., Rochester. Est. $150,000. Noted Mar. 26.

N. J., Franklin Lakes — Bd. Educ., Camp Gaw School, general contract 1 story, basement, brick, steel, rein.-con., to Tri-City Constr. Co., 100 Westminister Pl., Garfield; heating and plumbing, to J. F. Polmann, 581 Central Ave., Carlstadt; electrical work, to Carlstadt Electric Co., 551 Madison Ave., Carlstadt. Est. $150,000. Noted Apr. 2 Daily.

N. J., Westwood — Bd. Educ., High School, general contract Senior High School, 2 story basement, brick, steel, 3rd Ave., to C. A. Vezzetti, 50 Brook Lane, Palisade, $120,000; plumbing, to Zabransky Bros., 19 Pickens St., Little Ferry, $11,897; heating, to D. McGrath Co., 185 Moore St., Hackensack, $20,500; electrical work, to A. Neri, Inc., 928 Washington St., Hoboken, $13,700. Grand total $166,097. Noted Mar. 31 Daily.

N. Y., Ithaca—Cornell University, 2 story, basement, brick, steel, concrete dormitory, to Crowell & Little Constr. Co., 930 Hanna Bldg., Cleveland, O. Est. $175,000.

N. Y., New York — General Theological Seminary of Protestant Episcopal Church, 175 9th Ave., 5 story, 66 x 96 ft. school, to E. E. Paul Co., 101 Park Ave. Est. $165,000. Noted Apr. 9.

O., Canton — Stark Co., general contract 2 story, brick, stone high school, Middlebranch Plain Twp., to H. S. Melbourne Contg. Co., 2101 Woodland Ave. N. W., $150,000.

O., Delaware—Bd. Educ., F. C. Bergon, clk., general contract 3 story, basement, brick, stone high school, incl. gymnasium, auditorium, to Van Gundy-Beck Co., Lancaster. $209,000. Noted Apr. 9.

Pa., Erie—Bd. Educ., S. W. Reichard, pres., Library Bldg., general contract Edison Elementary School, 2 story, basement, 95 x 171 ft., brick, stone, incl. gymnasium, to Laird Bros. Constr. Co., 102 Lake St., Ashtabula, O. Est. $185,000. Noted Mar. 26.

Pa., Scranton — Bd. Educ., J. D. Hughes, secy., 425 Washington St., general contract 2 story, basement, 99 x 140 ft., rein.-con., brick, steel, plain found., Capouse Ave. and Ash St., to Freig Bros., Real Estate Bldg., $155,536; heating and plumbing, to H. N. Gardner, 920 Green Bldg., $25,551 and $8,378 respectively. Grand total $189,465.

THEATRES

PROPOSED WORK

Calif., Long Beach—United Artists Theatres of California, 931 South Bway., Los Angeles plans by Walker & Eisen, Western Pacific Bldg., 100 x 150 ft., 1,500 seating capacity, rein.-con. theatre, store.

Calif., Los Angeles—C. Laemmle, c/o Walker & Eisen, archts., Western Pacific Bldg., 2 story, 118 x 150 ft., rein.-con. theatre, store, office, Vine and Hollywood Sts.

S. C., Columbia—Paramount Publix Theatres, Paramount Bldg., 44th St. and Bway., New York, theatre, Main St. $600,000. **Maturity soon.**

BIDS ASKED

Ind., Angelo—Westley Corp., 228 North La Salle St., Chicago, Ill., taking bids 2 story, basement, 60 x 200 ft., brick, steel theatre. $150,000. Private plans.

N. H., Franklin—S. Kurson, 60 Norfolk St., Bangor, Me., taking bids 2 story, basement, brick, concrete, steel theatre, store, office, plain found. $150,000. Bunker & Savage, 256 Water St., Augusta, Me., archt.

N. J., Ridgewood—May 4, by T. Lamb, archt., 644 8th Ave., New York, general contract 2 story, basement, 80 x 190 ft., brick, steel, theatre, Ridgewood Ave., for Warner Bros., 321 West 44th St., New York. Est. $250,000. Weinberger & Wershoff, Inc., 247 Park Ave., New York, consult. engrs. Noted Oct. 9 Daily.

Tex., Del Rio—Hughes Franklin Theatres Co., c/o H. Hughes, pres., Hollywood, Calif., c/o M. M. Kravetz, representative, Los Angeles, Calif., taking bids 2 story, fireproof theatre, Main and Losolla Sts. $150,000. Private plans. Noted Apr. 2.

CONTRACTS AWARDED

Ind., Frankfort—Owner, c/o Leonard & Wolf, archts., general contract 2 story, basement, 65 x 130 ft., brick, steel, stone theatre, incl. sound apparatus, store rooms, South Main St., to L. E. Wickersham, Logansport. Est. $150,000.

Mass., Boston—Adams House Realty Corp., H. K. Noyes, pres., 857 Commonwealth Ave., 2 story, basement, brick, concrete steel theatre, plain found., Washington St., to G. B. H. Macomber Co., 38 Chauncy St. Est. $2,500,000 Paramount Publix Corp., 1501 Bway., New York, lessee. Noted Apr. 9.

OFFICES

PROPOSED WORK

Mich., Grand Rapids — Hammerslag & Tinkham, 302 Association of Com. Bldg., plans by J. and G. Daverman, 311 Association of Com. Bldg., and C. Steketee, Grand Rapids, 7 story, basement, brick, rein.-con., steel office, for Western Union Telegraph Co. and general office space, plain found., Division Ave. $155,000.

N. J., Paterson—Island Market Corp., P. Alfano, in charge, Bank St., sketches by J. Bellomo, 6 Park Ave., 2 story, basement, brick, steel store, office, storage, comfort station, Island Market Sect. $150,000.

Offices (Continued)

N. Y., New York—One Hundred Twenty Park Avenue Corp., c/o W. Ziegler, Pershing Sq., 60 story office, Park Ave. and 42nd St. $20,000,000. Demolishing present building to Hegeman Harris Co., 360 Madison Ave.

BIDS ASKED

Conn., Hartford—May 4, at office E. S. Dodge Co., archts., 148 State St., Boston, Mass., brick, steel office addition, Asylum St., for Hartford Fire Insurance Co., 690 Asylum St., R. M. Bissell, pres. To exceed $150,000. French & Hubbard, 210 South St., Boston, Mass., engrs. Noted Mar. 12.

STORES

PROPOSED WORK

N. J., Montclair — Owner c/o W. J. Fitzsimons, archt., 626 Central Ave., East Orange, 3 story, basement, brick, steel, store, office. $150,000.

N. Y., Brooklyn—Mayo Beck Realty Corp., 8 Mayo St., plans by M. Marko, 200 Beverly Rd., 6 story, 100 x 115 ft. store, apartment, Mayo St. $300,000.

N. Y., New York — Empire Square Realty Corp., 1931 Bway., plans by J. L. Miller, c/o owner, store, office, Bway. and 65th St. $150,000.

N. Y., New York—St. Johns House, Inc., 1860 Bway., plans by G. F. Pelham, 570 7th Ave., 19 story store, apartment, 1082 Amsterdam Ave. $450,000. **Maturity soon.**

N. Y., New York—Walton Avenue Building Corp., c/o J. Halpern, 414 East 204th St., plans by Franklin, Bates & Heindsmann, 2526 Webster Ave., 6 story store, apartment, Walton Ave. and 176th St. $180,000.

Pa., Phila.—Blauners, Inc., 9th and Market Sts., plans by S. Kaplan, 10 South 18th St., rein.-con., brick, steel store, plain found., 9th and Market Sts. $250,000.

Ont., Saulte Ste. Marie—T. Eaton Co. Ltd., 190 Yonge St., Toronto, 2 story, basement, brick, concrete, steel department store. $250,000. Private plans.

BIDS ASKED

N. J., Asbury Park — C. B. Cock, archt., Asbury Park Trust Bldg., bids about May 1, general contract 2 story, basement, brick, steel, store and office, for J. Ackerman, 404 Asbury Ave. $150,000. Noted Apr. 9.

N. J., Asbury Park—LeR. Godfrey, archt., Kinmouth Bldg., bids about May 15, general contract 2 story, basement, brick, steel store, office, Main St., for S. Flint, 1010 Corlies Ave. $150,000. Noted Apr. 2.

N. J., Maplewood—W. J. Fitzsimmons, archt., 626 Central Ave., East Orange, bids about May 15, general contract 2 story, basement, brick, steel store, apartment, 91 Baker St., for E. J. Baker, c/o archt. $150,000. Noted Apr. 9.

N. J., Newark—See "Contracts Awarded."

N. J., Newark—One Thousand Fourteen Broad Street Corp., A. M. Slavitt & D. Cronheim, 39 Branford Pl., taking bids 3 story, basement, brick, steel store, office, 1014 Broad St. $150,000. Bottelli & Bottelli, 45 Branford Pl., archts. Noted Mar. 26.

N. J., Paterson—J. Bellomo, archt., 6 Park Ave., bids about May 1, general contract 2 story, basement, 36 x 125 ft., brick, steel store, office, storage, comfort station, Island Market Sect., for Island Market Corp., J. Alfano, in charge, 7 Bank St. $150,000. Noted Apr. 23.

Pa., Phila.—May 1, by S. Kaplan, archt., 10 South 18th St., 4 story, basement, 76 x 102 ft., rein.-con., brick, steel store, plain found., 9th and Market Sts., for Blainers, Inc., 833 Market St. $750,000.

CONTRACTS AWARDED

Conn., Hartford—I. Wise, Wise Smith & Co., Main St., 3 story, basement, 44 x 161 ft., brick, steel store, office, plain found., to Southern New England Constr. Co., 34 State St., $225,000; fabricating, erecting steel, to Levering & Garrigues Co., 36 Pearl St. Noted Apr. 2.

N. J., Newark—A. Radnevitz, 53 Chancellor Ave., 3 story, basement, brick, steel store, apartment, separate contracts. $150,000. S. Cohen, 134 Branford Pl., archt. Noted Apr. 23.

N. Y., Forest Hills—El Walt Realty Corp., 617 Empire Blvd., Brooklyn, 6 story, basement, 91 x 265 ft. store, apartment, Ascan Ave. and Austin St., separate contracts. $500,000. Noted Mar. 26.

LOFTS

PROPOSED WORK

N. J., Newark — Owner, c/o J. Centanni, archt., 142 Market St., will not build 3 story, basement loft addition. $150,000. Project abandoned. Noted Mar. 19.

PUBLIC

PROPOSED WORK

Massachusetts—POLICE BARRACKS, etc.—Commonwealth of Massachusetts, Dpt. P. Safety, Boston, state police barracks, office, cells, garage and barn at either Middleboro or Bridgewater. $150,000 or more. Architect not selected.

Mass., Springfield—MUSEUM—City Library Assn., plans by E. L. Tilton, 420 Lexington Ave., New York, Gray Art Museum, State and Chestnut Sts. $350,000. **Maturity about June 1.** Noted Apr. 9.

Minnesota—COTTAGES, etc.—State Bd. Control, Mrs. B. La Du, chn., Capitol St. Paul, soon takes bids $1,053,250 permanent improvements, incl. cottages, $200,000, power plant additions $161,000, at School for Epileptics, Cambridge; improvements at Hospital for Dangerous Insane, St. Peter, $135,000; cottages at School for Feeble-Minded, Taribault, $130,000; addition to infirmary, State Tuberculosis Sanatorium, Walker, $100,000.

Minn., St. Cloud—CELL—State Com. Administration & Finance, 10 Capitol, St. Paul, plans by C. H. Johnston, 360 Robert St., St. Paul, rein.-con., brick, stone trim, cell wing addition at State Reformatory. $166,000.

N. J., Caldwell—LIBRARY—Bd. Boro Council, Boro Hall, 2 story, basement, brick, steel library, civic center, Westfield and Poseland Aves. $200,000. **Maturity probably soon.** Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted Mar. 5.

N. J., Elizabeth — CITY HALL and MUNICIPAL — Bd. City Comrs., City Hall, plans by Oakley & Son, 1259 Clinton Pl., brick, steel. $1,000,000. **Maturity indefinite.** Noted Apr. 9.

N. J., Metuchen—LIBRARY—Bd. Trustees Free Pub. Library, 2 story, basement, brick, steel. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Newark—MARKET—Bd. City Comrs., City Hall, 1 story, brick farmers market. $150,000. **Maturity soon.**

N. J., Perth Amboy—FIRE HOUSE—Bd. City Comrs., City Hall, bids probably in June, general contract 3 story, basement, brick, steel. $150,000. Greisen & Tuzik, 175 Smith St., archts. Noted Mar. 19.

N. J., Union—MUNICIPAL—Township Comn., Township Hall, brick, steel building. $150,000. **Maturity probably soon.** Architect not selected.

Que., Jonquiere — POST OFFICE — Dpt. P. Wks., Ottawa, Ont., soon takes bids stone, steel post office. Est. $100,000.

BIDS ASKED

Mass., Sudbury—TOWN HALL—Town, H. N. Fairbanks, chn. comr., taking bids 2 story, basement, brick town hall, concrete found., Main St. $150,000. C. H. Way, 6 Beacon St., Boston, archt. Noted Mar. 26.

N. J., Newark — FIRE HOUSE — Bd. City Comrs., City Hall, bids about May 15, 3 story, basement fire house, 18th Ave. and Norwood St. $150,000. F. Grad, 1023 Broad St., archt. Noted Mar. 19.

N. Y., Ozone Park—POLICE STATION, etc. —May 1, by E. P. Mulrooney, police comr., Police Dpt., 240 Centre St., New York, new 56-A Precinct Station House, Prison and Garage, 103-47 to 103-55 101st St.

N. Y., Syracuse—COUNTY HOME—May 1, by H. F. Brooks, chn. Charities Com., Court House, 3 story, basement, brick, steel county home, incl. additoins to dormitories, plumbing, heating, electrical work for new laundry building, automatic sprinklers for women's building, Onondaga Hill. $370,000. M. L. King, Dennison Bldg., archt. Noted Mar. 19.

N. Y., Wallkill—PRISON—Dpt. Architecture, State Office Bldg., Albany, bids about May 24, medium security prison, Ulster Co., near here, for State. $1,500,000.

CONTRACTS AWARDED

Conn., Washington—TOWN HALL—Trustees Bryan Memorial, Town Hall, 2 story, basement, 120 x 120 ft., brick, concrete, to H. Maring, 536 Lindley St., Bridgeport. Est. $130,000-$150,000. Contractor now taking separate contract bids. Noted Mar. 26.

D. C., Wash.—MEMORIAL TEMPLE—District of Columbia World Ward Memorial Comn., white marble memorial temple, West Potomac Park, to James Baird Co., 201 East Capitol St.

Ind., Evansville — LIBRARY — Pub. Library Bd., E. L. Craig, pres., Amer. Trust Bldg., 4 story, basement, 85 x 144 ft., rein.-con., brick, steel, concrete pile found., to L. W. Hancock Eng. & General Contg. Co., Louisville Trust Bldg., Louisville, Ky., $267,985. Noted Feb. 12.

N. J., Morristown — JAIL and OFFICE — Morris Co., Court House, general contract jail and office building, to Bontempo & D'Annunzio, Inc., 39 Washington St., $227,000; heating and ventilating, to P. Slack, 211 Perry St., Trenton, $17,124; plumbing, to Jaehnig & Peoples, Inc., 221 13th Ave., Newark, $27,100; electrical work, to J. C. Morris, Inc., 26 Journal Sq., Jersey City, $10,610; jail equipment, to Van Dorn Iron Wks., 2685 East 79th St., Cleveland, O., $34,643. Grand total $316,477. Noted Mar. 12.

N. Y., Beacon—WARD—Commissioner Dpt. Correction, State Office Bldg., Albany, general contract ward female group, communicating corridor, auditorium and chapel, to A. E. Stephens, 1200 Main St., Springfield, Mass., $279,300; heating, to Murphy & Beaumont, 303 West 42nd St., New York, $29,747; sanitary work, to Boro Eng. Corp., Chatham Phoenix Bldg., Long Island City, $10,797; electrical work, to W. H. Straut Co., Haverstraw, $15,600. Grand total $335,444. Noted Feb. 26.

O., Youngstown—ART GALLERY—City, 2 story, basement, stone addition to Butler Art Institute, incl. class rooms, library and garden court, to Johnson & Carlson, Mahoning Bank Bldg., $151,000. Noted Feb. 26.

R. I., East Providence (br. Providence) — FIRE STATIONS—Town of East Providence, J. F. Frost, chn. building com., Central Station 1 and Rumford Dist. Station 3, to Siravo & Lombardi, 98 Touro Ave., Providence; Station 2, to J. H. Baum Constr. Co., 84 Broad St. Providence. Est. $150,000. Noted Mar. 19.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—AUTOMOBILE—E. L. Cord, Wilshire Blvd. and Mariposa Ave., plans by A. C. Martin, 228 Higgins Bldg., 4 and 5 story, 140 x 195 ft., steel, Wilshire Blvd. and Mariposa Ave. $250,000.

O., Cincinnati—AUTO SUPPLY—L. Wise, 917 Race St., plans by Rendigs, Panzer & Martin, 519 Main St., 3 story, basement, brick, stone, rein.-con., plain found., Race St. $200,000.

BIDS ASKED

Pa., Phila.—EXCHANGE—May 4, by J. I. Windrim, archt., Commonwealth Bldg., 2 story, basement, irregular sized, rein.-con., brick, steel, plain found., Frankford and Oxford Sts., for Bell Telephone Co., 1836 Arch St.

CONTRACTS AWARDED

Mo., Kansas City — EXCHANGE — Southwestern Bell Telephone Co., 11th and Pine Sts., St. Louis, superstructure 2 story, basement, 104 x 140 ft., rein.-con., brick, to Longsdale Bros., 1342 Telephone Bldg., terra cotta contract, to Kansas City Terra Cotta Co., 19th and Manchester Sts. Noted Apr. 9.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Del., New Castle—STEEL PLANT—Intercontinental Pipe & Mining Co., c/o Herbert Kennedy Cast Iron Pipe Co., 122 East 42nd St., New York, altering and re-equipping plant. $1,000,000. **Maturity after Aug.** Noted Feb. 19.

Mo., St. Louis—FACTORY—Old Peacock Sulton Co., 112 North 2nd St., soon takes bids 4 story, basement, 40 x 125 ft., rein.-con., brick, steel, terra cotta, Taylor Ave. and Parkview Pl. Clymonts & Heinicke, 721 Wainright Bldg., archts.

N. J., Butler—RUBBER PLANT—Amer. Hard Rubber Co., Boonton Ave., brick, steel addition. $40,000 or more. Private plans.

N. J., Elizabeth—FACTORY—Fordham Shirt Co., Fulton St., altering and constructing 2 story, basement, 35 x 100 ft. addition, 5th and Fulton Sts. $40,000. Project in abeyance. L. Quien, Jr., 229 Broad St., archt. Noted Feb. 26.

N. J., Elizabeth — RUBBER STAMP FACTORY—Fulton Specialty Co., 128 Fulton St., altering 5 story, basement, brick, steel, Fulton St. $40,000. **Maturity probably soon.**

N. J., Hoboken—FACTORY—Garsten Realties Co., J. Bonanno, pres., 1837 Bergen Turnpike, North Bergen, revised plans and bids in July, 1 story, basement, brick, steel, Madison and Jefferson Sts. between 14th and 15th Sts. $40,000. Private plans. Noted Apr. 16.

N. J., Jersey City—ENGINE PLANT—Montgomery Cylinder & Grinding Co., 678 Montgomery St., 1 story, basement, 68 x 100 ft., auto engine remodeling plant, Allen St. and Tonnelle Ave. $40,000. **Maturity indefinite.** Noted Apr. 16.

N. J., Milburn — DRESS FACTORY — P. Massella, 40 Main St., plans by E. P. Bonnett, 363 Bloomfield Ave., Montclair, 2 story, basement, 45 x 70 ft., brick, steel. $40,000. Noted Apr. 23.

N. Y., Brooklyn—SILK DYEING PLANT—T. Lupo, 913 Grand St., 1 story, 125 x 176 ft. silk dyeing plant, Waterbury and Meadow Sts. $40,000. **Maturity after July 1.** M. Klein, 65 Court St., archt. Noted Apr. 16.

N. Y., Brooklyn—BREWERY and STORAGE —F. and M. Schaefer Brewing Co., Kent Ave. and South 10th St., 8 story, brick, concrete, Kent Ave. and South 10th St. To exceed $100,000. Waldemar Mortensen, 103 Park Ave., New York, archt.

N. Y., Brooklyn—FACTORY—C. H. Liebfried, 112 Dobbins St., sketches by J. A. Napoli, 151-01 32nd Ave., Flushing, 1 story, 70 x 100 ft. factory, Guernsey St. and Norman Ave. $40,000.

N. Y., Corinth—PAPER PLANT—International Paper Co., 220 East 42nd St., reconstruct woodroom and sulphur tower. To exceed $40,000.

N. Y., Hampton Bays—MILK DISTRIBUTION PLANT—Sheffield Farms Co., 524 West 57th St., addition, Montauk Hy. To exceed $40,000.

N. Y., Long Island City—PUMP HOUSE—Standard Oil Co., 26 Bway., New York, plans by S. Wortmann, 116 Lexington Ave., New York, 3 story, 47 x 47 ft. pump house, equipment, 5th St. and 6th Ave. $40,000.

N. Y., Syracuse —ACETYLENE FACTORY—Union Carbide & Carbon Co., 30 East 42nd St., New York, acetylene plant. $150,000. Project indefinitely in abeyance. Private plans. Noted Feb. 12.

O., Canton—ACETYLENE GAS MANUFACTURING PLANT—Union Carbide & Carbon Co., 30 East 42nd St., New York, acetylene gas manufacturing plant. $150,000. Project in abeyance, will not go ahead this year. Private plans. Noted Feb. 12.

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Factories and Mills (Continued)

O., Cleveland—FACTORY—Ohio Carbon Co., J. E. Schunck, secy-treas., 12507 Berea Rd., sketches by George S. Rider Co., archts and engrs., Marshall Bldg. 1 story, brick, steel addition. $40,000.

Tex., Mineral Wells — FACTORY — Mineral Wells Clay Products Co., c/o A. E. Eaton, pres., clay products plant. $100,000.

Tex., San Antonio—MATTRESS FACTORY—Sealy Mattress Co., c/o N. Deeber, 1002 South Medina St., expanding plant. $275,000, incl. purchase new building, new equipment, facilities to handle expanded business. Private plans.

Alta., Calgary — MANUFACTURING — Provincial Govt., Edmonton. D. E. H. Boomer, in charge, semi-commercial plant for manufacturing benzine from waste gas.

Ont., Fergus — PLANT — Beatty Bros., two 50 x 150 ft. steel, brick additional plant units, concrete founds., $100,000. Private plans.

Ont., Toronto—COLD STORAGE PLANT—Highland Dairy Co. Ltd., 670 Ontario St., 35 x 50 ft. brick, concrete cold storage unit. $75,000.

Ont., Toronto—PLANT—Dominick Tar & Chemical Co., H. O., 606 Cathcart St., Montreal, Que., 1 story, concrete, steel, brick addition to tar and tar products plant, foot Logan Ave. $250,000. Private plans.

Ont., Willow Grove — PLASTER MILL — Canadian Gypsum Co. Ltd., plaster mill, board plant, office and warehouse. $150,000.

BIDS ASKED

Mass., Cambridge—CLEANSING PLANT—H. J. Shea & Co., 2225 Mass. Ave., taking bids 1 story, basement, 60 x 100 ft., brick, steel, concrete found., Mass. Ave. $40,000. W. Galvin, 34 Brattle St., archt. Noted Apr. 2.

Tex., El Paso—ICE PLANT—See "Contracts Awarded."

CONTRACTS AWARDED

Ill., Chicago—FACTORY—Bell & Howell Co., 1803 Larchmont Ave., general contract 1 story, 13 ft. high, 112 x 153 ft., rein.-con., brick top addition, incl. sound laboratory, sound projection studio with stage, 17,000 sq.ft. floor space, North Rockwell St. and Belle Plaine Ave., to Schmidt Bros. Constr. Co., 22 East Huron St.

Ill., Niles Center—MEDICINE FACTORY—Petrolagar Laboratories, Inc., 536 Lake Shore Dr., Chicago, general contract (1st unit) 1 and 2 story, steel, white tile, cream colored brick, gray stone, black granite, on 7.5 acre site, McCormick Blvd. and Cleveland Ave., to Regan Constr. Co., 228 North La Salle St., Chicago. Est. $250,000.

Ind., South Bend—DAIRY PLANT—Wittner & Saubendissen, general contract rein.-con., brick, steel, to H. Hager, 1812 West Lafayette St. Est. $40,000.

Mass., Boston—FACTORY—Boston Sausage Co., 157-163 Blackstone St., altering and constructing 4 story, brick addition, incl. 2 new steam houses, 6 new smoke houses, to W. C. Sharkey Co., Inc., 29 Ferry St.

Miss., Jackson — FACTORY, etc. — N. W. Overstreet, archt., Mississippi Fire Insurance Bldg., 1 factory, 2 warehouses, 5 outbuildings, all 1 story, rein.-con. found., 50,000 sq.ft. floor space, to W. G. Wetmore Constr. Co., Jackson, for International Match Co., Natchez and 25 West 43rd St., New York. $125,000. Noted Mar. 12.

Mo., St. Louis—ICE PLANT—West End Ice Co., 120 Chouteau Ave., 1 story, basement, 75 x 80 ft., concrete, brick, 3945 Easton Ave., to M. R. Rosenmeyer, 1548 South Vandeventer St.; ice making machinery, to Ball Ice Machine Co., 120 Chouteau Ave.

N. J., Butler—PLANT—Amer. Hard Rubber Co., Boonton Ave., general contract altering and constructing 1 story, basement, 95 x 275 ft., brick, steel addition, to Walter Kidde & Co., 140 Cedar St., New York. Est. $150,000.

N. J., Newark — FACTORY, etc. — W. E. Lehman, archt., 972 Broad St., general contract 2 story, 98 x 130 ft., brick, rein.-con. factory, office, to Drill Contg. Co., 889 Broad St., for Oliver Relish Co., 115 South St. Est. $40,000. Noted Apr. 23.

N. J., Paterson — SILK PRINTING PLANT—Strenge Dye Wks., Inc., 21 Jane St., general contract 2 story, basement, 85 x 90 ft., brick, steel, 9-15 Jane St., to J. H. Steele & Son, 48 North 2nd St. Est. $40,000.

Tex., El Paso—ICE PLANT—E. Held, 2209 Tremont St., 1 story, brick, concrete, 75 ton capacity, day labor. $80,000. Private plans.

Ont., Brockville—COPPER ROD ROLLING MILL—Eugene F. Phillips Electrical Wks., Brockville, copper rod rolling mill, incl. semi-automatic mill equipped with roller, 15 tons ¾ in. copper rods per hr. capacity, to Dominion Eng. Wks., Ltd., Lachine, Montreal, Que., $225,000 incl. equipment.

GARAGES

PROPOSED WORK

Calif., Pasadena — City Council sub-station. Skillen [illegible]. To exceed $50,000, incl. equipment.

D. C., Wash—Corporation, c/o D. N. Boyd, c/o Boyd, Abel & Gugert, archts., Otis Bldg., Phila., Pa., sketches garage, market, theatre, H., I., 10th and 11th Sts., N. W. $5,000,000. **Maturity about July 1.**

N. J., Jersey City—J. Goldenberg, 80 Woodland St., Englewood, revised sketches by C. Shilowitz, 26 Journal Sq., 4 story, basement, brick, steel, rein.-con. garage, showrooms, Sip and Summit Aves. $150,000. Noted Feb. 10 Daily.

N. Y., Brooklyn — F. Calahrese, 1612 2nd Ave., New York, bids late in fall, general and separate contracts 1 story, 100 x 110 ft. service garage, Fenimore St. and Albany Ave. $40,000. D. L. Lang, 1860 Bway., New York, archts. Noted Apr. 16.

N. Y., Brooklyn—S. Marinello, 2783 East 27th St., sketches by F. C. Deheimer, 8761 24th Ave., 1 story, 100 x 100 ft. service garage, Ralph Ave. and Canarsie Lane. $40,000.

N. Y., Brooklyn—F. Nyes, 149 Van Sicklen Ave., sketches by W. Richter, 301 Elmwood Ave., 1 story, 102 x 156 ft., brick, steel service garage, Lake St. and Avenue S. To exceed $40,000.

N. Y., Brooklyn—M. Rubin, 430 5th Ave., plans by A. A. Blaunstein, 1102 Kings Highway, auto laundry, service garage, Coney Island Ave. and Avenue N. $40,000.

N. Y., Brooklyn—Turnschless Holding Corp., A. Schlesser, pres., 330 Douglass St., sketches by W. A. Lacerenza, 16 Court St., service garage, Douglass St. and 4th Ave. $40,000, incl. equipment.

N. Y., New York — Eight Hundred Forty Barry Street Corp., 704 East 133rd St., sketches by P. H. Murray, 14 West 45th St., 2 story, 40 x 190 ft., brick, steel service garage, Barry St. and Burnet Pl. $250,000.

BIDS ASKED

Mass., Boston—D. A. Mullin, 18 Tremont St., taking bids 1 story, brick, rein.-con., steel garage and repair shop, concrete found., Mayflower and Cambridge Sts. $45,000. M. J. Mastrangelo, 40 Court St., archt.

Mass., Hingham—Town, W. L. Foster, chn. Bd. Selectmen, taking bids 1 story, concrete garage and storage. $40,000. L. Foster, 6 Middle St., archt. Noted Mar. 19.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Brooklyn—May 8, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, general contract garage and mortuary at Coney Island Hospital, Ocean Parkway, Avenue Z, and East 6th St. G. M. McCabe, 96 5th Ave., New York, archt. Noted Mar. 26.

CONTRACTS AWARDED

Conn., Waterbury—Kaplan Bros., 352 East Main St., 1 story, basement, 50 x 110 ft., brick, steel auto sales and service building, to Thomas G. Smith Co., 18 Orange St. Est. $40,000. Noted Apr. 16.

Mo., St. Louis—Goodrich Silvertown, Inc., R. E. Kenner, zone mgr., 23rd and Olive Sts., 1 story, part basement, 80 x 112 ft., rein.-con., brick, terra cotta, super service station, Gravois Ave. and Potomac St., to Kenton Constr. Co., Wainwright Bldg.

N. Y., Brooklyn—P. and C. Building Corp., 1630 Carroll St., 1 story, 100 x 140 ft., brick service garage, Avenue I and East 35th St., day labor and separate contracts. $40,000. Soon takes bids. H. J. Nurick, 44 Court St., archt. Noted Apr. 16.

N. Y., New York—Thirty West End Corp., 33 West 42nd St., 4 story garage, storage, to Wallenstein Constr. Co., 33 West 42nd St. Est. $100,000. Noted Apr. 23.

N. Y., Tottenville (br. Staten Island)—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, general contract repair company building, to M. J. Mallin, $32,078; electrical work, to J. Hoffman & Co., Inc., $1,100; Plumbing, to D. Blaine & Son, 17 Price St., Ft. George, $2,877; heating, to R. W. Baylor, 9 Sommers Pl., Port Richmond, $3,146. Grand total $39,201. Noted Apr. 2.

SHOPS AND FOUNDRIES

PROPOSED WORK

Mo., St. Louis — SHOP and FOUNDRY — Busch-Sulzer Bros. Diesel Engine Co., 3300 South 2nd St., soon takes new bids on revised plans shop and foundry building, 3300 South 2nd St. $250,000. W. J. Knight & Co., 903 Wainright Bldg., engr. Noted Mar. 26.

N. Y., Brooklyn—SHOP—Dpt. Parks, Arsenal Bldg., Central Park, New York, 1 story, 34 x 104 ft. shop, service garage, Prospect Park, 9th Ave. opposite 5th St. $40,000 incl. equipment. **Maturity soon.** Private plans.

O., Zanesville—FOUNDRY, etc.—Zane Casting Co. soon takes bids three 1 story, steel buildings, incl. foundry, machine shop and storeroom. $50,000. Private plans.

BIDS ASKED

N. J., Newark — REPAIR SHOP — Fischer Auto Sales Co., 596 South 11th St., taking bids general contract 2 story, 60 x 135 ft., brick, steel, auto repair shop and service station, 606-10 South 11th St. $40,000. R. L. Pryor, 11 Governor St., archt.

CONTRACTS AWARDED

Mich., Detroit — FOUNDRY — Detroit Gray Iron Fdry. Co., Iron and Wight Sts., 1 story, 115 x 170 ft., brick, steel, concrete addition, plain found., to W. S. Pocock, 1726 Seward Ave. Est. $50,000.

N. Y., Auburn—FOUNDRY, etc.—Dpt. Correction, State Office Bldg., Albany, foundry and shop, to National Concrete Fireproofing Co., 925 Citizens Bldg., Cleveland, O., $406,000.

POWER PLANTS

PROPOSED WORK

Minnesota—See "Public."

N. Y., Brooklyn—Brooklyn & Queens Transportation Co., 385 Flatbush Ave. extension, plans by H. K. Kolb, 385 Flatbush Ave. extension, 1 story, 40 x 70 ft. power substation, St. Paul's Court and Ocean Ave. $45,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, soon takes bids general contract power generating plant, boilers, etc. at Kings County Hospital, Clarkson and Albany Aves. $800,000. L. P. Ward, 205 East 42nd St., New York, archt.

N. Y., New York — Shire Realty Co., 26 Court St., Brooklyn, plans by Levy & Berger, 375 Fulton St., Brooklyn, 72 x 105 ft. boiler plant, storage, 1220 Bway. $150,000.

O., Piqua—City plans by Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., power plant.

Tex., Eagle Pass—Central Power & Light Co., Alamo Natl. Bank Bldg., San Antonio, soon takes bids 2-3 story, 40 x 100 ft., brick, steel, rein.-con. power plant, incl. new 750 hp. power unit. $75,000. L. F. Harza Eng. Co., 20 North Wacker Dr., Chicago, Ill., engrs. Noted Apr. 23.

BIDS ASKED

Conn., Bristol—Connecticut Light & Power Co., Riverside Ave., taking bids 3 story (50 ft. high), 60 x 60 ft., brick, steel, concrete steam power plant, 2 steel oil tanks and spur track, 40 x 75 ft., rein.-con. tank, steam line, Riverside Ave. $175,000. H. A. Hayden, 175 North Main St., archt. Noted Apr. 2.

Ind., Crawfordsville—May 18, by City. L. S. Kirtley, clk., rein.-con., steel, brick power plant, incl. 950 hp. water tube boiler with superheater and soot blower, forced draft chain grate stoker. $60,000. H. C. Carroll, 360 North Michigan Ave., Chicago, Ill., engr.

Mass., Springfield—United Electric Light Co., 73 State St., taking bids brick, steel, concrete transformer sub-station, incl. steel tower, electrical power equipment, Page Blvd., East Springfield. Est. $1,000,000 or more. Private plans, J. P. McKearin, ch. engr. Noted Jan. 29.

CONTRACTS AWARDED

Mich., Baraga—Holland, Ackerman & Holland, engrs., 20 North Wacker Dr., Chicago, Ill., general contract rein.-con., steel, brick power house for hydro-electric plant, Sturgeon River, 7 mi. west of here, to Price Bros. Co., Findlay St., Dayton, O.; structural steel, to A. C. Woods & Co., 1129 Harrison Ave., Rockford, Ill.; generators, to Allis-Chalmers Co., West Allis, Wis.; turbines, governors, to S. Morgan-Smith Co., Hartley and Lincoln Sts., York, Pa., for Baraga County Light & Power Comn. Noted Jan. 1.

N. J., Burlington—Pub. Serv. Corp. of New Jersey, Terminal Bldg., Newark, 18,000 kw. turbine unit, to Westinghouse Mfg. Co., 150 Bway., New York. Noted Apr. 16.

N. J., Kearny (sta. Arlington)—Pub. Serv. Electric & Gas Co. (Pub. Serv. Corp. of New Jersey), Terminal Bldg., Newark, 75,000 kw. steam turbine generator unit, to Westinghouse Mfg. Co., 150 Bway., New York. Noted Apr. 16.

N. Y., Brooklyn—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, Jay and Smith Street Sub-stations for Rapid Transit R.R., to Reiss Constr. Co., 186 Remsen St., $128,743. Noted Mar. 19.

N. Y., Buffalo—University of Buffalo, general contract 1 story, 55 x 108 ft., stone power house, Main St., to Crooker, Carpenter & Skaer, Crosby Bldg., $250,000.

WAREHOUSES

PROPOSED WORK

Calif., Oakland—City of Oakland Port Comn., 424 Oakland Bank Bldg., 1 story, 100 x 518 ft. steel, galvanized iron warehouse known as Warehouse AA, at 14th Street Pier. Private plans.

BIDS ASKED

Calif., Oakland—District Comrs. City of Oakland, Port Comn., 424 Oakland Bank Bldg., taking bids 1 story, steel, 100 x 518 ft., steel warehouse, incl. structural steel, sprinkler system, 14th Street Pier.

Mass., Cambridge—Metropolitan Ice Co., 321 Washington St., Somerville, taking bids 1 story, basement, irregular sized, brick, concrete storehouse, store, filling station, concrete found., Pacific and Brookline Sts. $40,000. Private plans.

N. Y., Albany—May 6, at office Albany Port Dist. Comn., 74 Chapel St., Warehouse A, Contr. 46. A. G. Chapman, ch. engr.; adv. E. N.-R. Apr. 30.

See proposal advertising on page 88